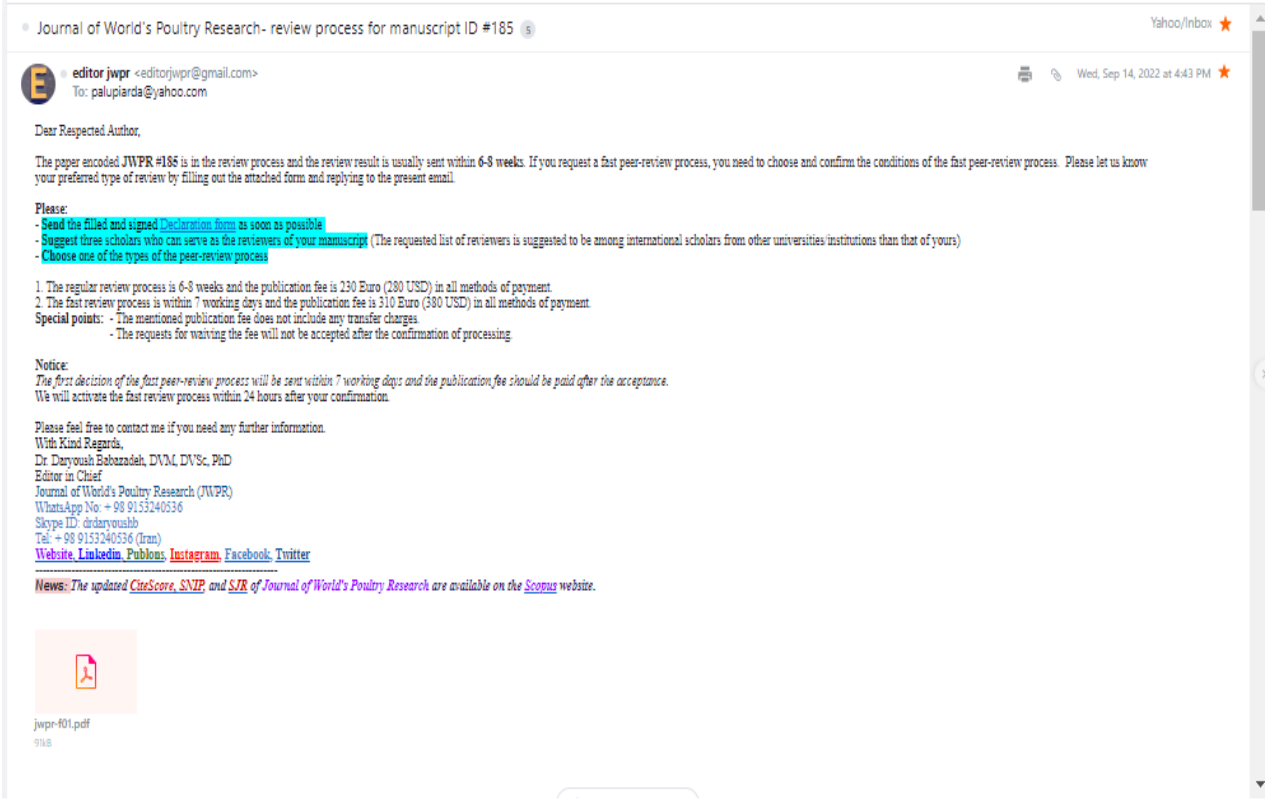
BUKTI KORESPODENSI
ARTIKEL JURNAL INTERNATIONAL BEREPUTASI

Judul Artikel : Effects of Lactobacillus-Fermented Feed on Production Performance and Carcass Quality of Broiler Chickens
Jurnal : The Journal of the world poultry Research, 2023, Volume 13(1): 127- 135.
Penulis : Rizki Palupi, Fitri Nova Liya Lubis, Anggriawan Naidilah Tetra Pratama

No	Perihal	Tanggal
1	Bukti konfirmasi submit artikel dan artikel yang disubmit	
2	Bukti Revisi editorial dan Konfirmasi proses review yang pertama.	14 September 2022 – 1 November 2022
3	Bukti hasil review pertama	22 November 2022
4	Bukti konfirmasi Submit hasil Revisi Pertama	2 Januari 2023
5	Bukti konfirmasi Hasil review ke-dua	10 Januari 2023
6	Bukti konfirmasi Submit hasil revisi ke-dua	29 Januari 2023
7	Bukti konfirmasi Hasil review ke-tiga	6 Februari 2023
8	Bukti konfirmasi Submit hasil revisi ke-tiga	9 Feberuari 2023
9	Bukti konfirmasi artikel accepted beserta invoice publikasi	13 Februari 2023
10	Bukti konfirmasi artikel published online	4 April 2023

1. Bukti konfirmasi submit artikel dan artikel yang disubmit

2. Bukti Revisi editorial dan Konfirmasi proses review yang pertama (14 September 2022 – 1 November 2022)



Journal of World's Poultry Research- review process for manuscript ID #185 5

Yahoo/Inbox

editor jwpr <editorjwpr@gmail.com>
To: palupiarda@yahoo.com

Wed, Sep 14, 2022 at 4:43 PM

Dear Respected Author,

The paper encoded **JWPR #185** is in the review process and the review result is usually sent within **6-8 weeks**. If you request a fast peer-review process, you need to choose and confirm the conditions of the fast peer-review process. Please let us know your preferred type of review by filling out the attached form and replying to the present email.

Please:
- **Send the filled and signed** Declaration form **as soon as possible**
- **Suggest three scholars who can serve as the reviewers of your manuscript** (The requested list of reviewers is suggested to be among international scholars from other universities/institutions than that of yours)
- **Choose one of the types of the peer-review process**

1. The regular review process is 6-8 weeks and the publication fee is 230 Euro (280 USD) in all methods of payment.
2. The fast review process is within 7 working days and the publication fee is 310 Euro (380 USD) in all methods of payment.

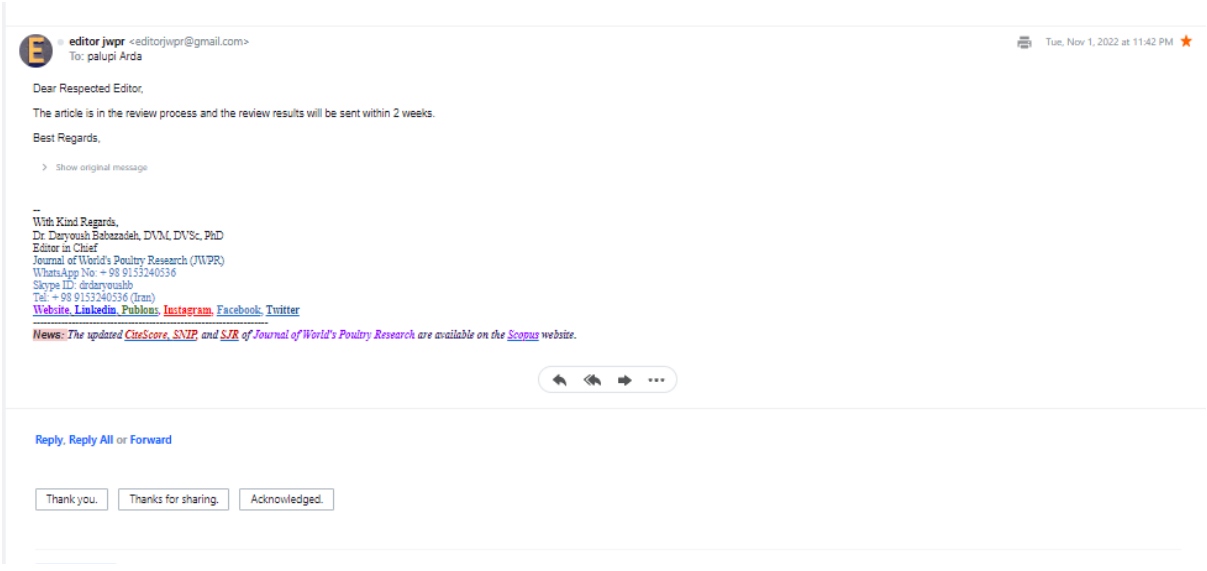
Special points: - The mentioned publication fee does not include any transfer charges.
- The requests for waiving the fee will not be accepted after the confirmation of processing.

Notice:
The first decision of the fast peer-review process will be sent within 7 working days and the publication fee should be paid after the acceptance.
We will activate the fast review process within 24 hours after your confirmation.

Please feel free to contact me if you need any further information.
With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

News: *The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.*

jwpr-f01.pdf
91kB



editor jwpr <editorjwpr@gmail.com>
To: palupi Arda

Tue, Nov 1, 2022 at 11:42 PM

Dear Respected Editor,

The article is in the review process and the review results will be sent within 2 weeks.

Best Regards,

Show original message

--
With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

News: *The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.*

Reply, Reply All or Forward

Thank you. | Thanks for sharing. | Acknowledged.

3. Bukti hasil review pertama (22 November 2022)

Journal of World's Poultry Research-Review Result for Manuscript ID #185

From: editor jwpr (editorjwpr@gmail.com)

To: palupiarda@yahoo.com

Date: Friday, November 25, 2022 at 12:24 AM GMT+7

Journal of World's Poultry Research

http://www.jwpr.science-line.com/index/

Dear Respected Author,

We sincerely apologize for this lengthly process.

I hope you are doing well. The paper encoded "**JWPR 185**" has been reviewed by our selected reviewers and editors and requires major scientific and linguistic revisions before publishing in The Journal of World's Poultry Research (JWPR). The following attachments are sent with regard to you. Kindly revise the manuscript according to the editor/reviewers' comments, edited article, and especially from Author's Instruction standpoint, and submit the revised manuscript within a week.

Please:
-Acknowledge the receipt of all the documents.
-Highlight all corrections/additions with green color in the revised manuscript.
-Reply to all marginal comments of reviewers/editors
-Indicate the manuscript type
-Include authors' names and affiliations, ORCID, and the Email address of the corresponding author in the revised word file.
-Indicate the corresponding author
-Add the Acknowledgements, Authors' contributions, Competing interests, Ethical considerations, and Authors' contributions to the revised article, respectively, with separate titles.
-Add DOI number to the end of each reference. Example: DOI:https://doi.org/10.1016/j.livsci.2016.09.003
-Design and send a graphical abstract for the accepted paper
-Fill out and send the Declaration form
-Don't change the name of the files.
-Don't delete the marginal comments of reviewer/s
-The Microsoft Office 2016 or upper versions for opening the manuscript file should be chosen.
-In case you are interested in language services, we can improve the quality of language by native language editors. The charge of this service is 80 USD upon your request.

If there is anything else, let me know.
We appreciate your interest in The Journal of World's Poultry Research (**JWPR**)

With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

News: ***The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.***

JWPR#185 E1.doc
236kB

Review_ comments,JWPR.docx
187kB

Review_ comments,JWPR #185.docx
187.9kB

JWPR
Journal of World's Poultry Research

2022, Scienceline Publication
J. World Poult. Res. 12(1): 00-00, Mar 25, 2022
Research Paper, PII: S2322455X2200000-12
License: CC BY 4.0

The Duration oOf Feeding Fermented wWith *Lactobacillus* iIn tThe Ration Towards tThe Production Performance aAnd Carcass Quality oOf Broilers

Rizki Palupi*, Fitri N. L. Lubis, and Muhakka

Departement of Technology and Livestock Industry, Faculty of Agricultural, Sriwijaya University, Indralaya, South Sumatera, Indonesia

*Corresponding ~~author's~~ author's Email: palupiarda@yahoo.com~~; ORCID : 0000-0001-5759-1428~~

Received: xx Mo. 2022
Accepted: xx Mo. 2022

ABSTRACT

~~T~~This ~~The~~ current research ~~aims~~ aimed to investigate the use of probiotics that develop in feed during the fermentation process in broiler rations ~~stop the use~~instead of antibiotics ~~in broiler rations by utilizing probiotics that develop in feed during the fermentation process, which can be used to~~on ~~improve~~ broiler chickens' ~~the~~ health and digestive ~~process function~~of broilers. ~~This study used~~A total of 180 one-day- ~~DOC~~old broiler chickens were used in the study~~s~~. This research was carried out ~~experimentally~~ using a ~~Completely~~ completely ~~Randomized~~ randomized ~~Design~~design, which consisted of ~~4~~ four treatments and ~~4~~ four replications for each treatment. The treatments ~~was~~ were classified into four groups based on the duration of fermented feed~~ing fermented~~ with *Lactobacillus* ~~(P1 = 2 weeks of feeding, P2 = 3 weeks of feeding, P3 = 4 weeks of feeding, and P4 = 5 weeks of feeding)~~. The ~~Observed~~investigated parameters included~~: P~~ performance of broilers, namely: ration consumption, body weight gain, and ration conversion. Carcass quality was also ~~observed, namely:~~evaluated by considering broiler chickens~~;~~" live weight, percentage of the carcass, and ~~broilers'~~ percentage of abdominal fat. The results ~~showed~~ indicated that the duration of fermented feed significantly ($P<0.05$) increased ration consumption by 40.07% ~~and~~, increased body weight gain by 13.77%, and decreased ration conversion by 25.33%. Subsequently, the duration of the fermented feed significantly ($P<0.05$) increased live weight by 17.80% ~~and increased the carcass percentage by 8.84%, and decreased the percentage of~~, increased the carcass percentage by 8.84%, and decreased abdominal fat by 12.90%.

Keywords: Broiler, Cearcass quality, Ffermented feed, Pperformance

INTRODUCTION

~~Broiler~~The broiler is one of the sources of animal protein that is in great demand among consumers. This is because the quality of broiler carcasses is ~~more~~ superior when compared to other types of poultry. The quality of broiler carcasses is greatly influenced by feeding management and the amount of nutrients digested in the digestive tract which will be utilized for optimal meat production. Efforts to increase the amount of digested nutrients~~,~~ are often done by processing the feed before consumption. One of the feed processing that can be done is by fermenting the feed. The fermentation process can increase feed digestibility and increase crude protein content, and also can reduce crude fiber in feed (Khempaka *et al*., 2014: Wongsa and Werukhamkul, 2007). ~~Fermented~~ The fermented feed provides ~~a number of~~several benefits, including serving as a feed preservative to extend the shelf life and ~~increasing~~ increase appetite, so that it will accelerate the growth of broilers.

The fermentation process requires an inoculant that is used to speed up the breakdown of nutrients in the feed. One of the inoculants that can be used is by adding *Lactobacillus*. *Lactobacillus* are lactic acid bacteria that are often used in the fermentation process. Lactic acid bacteria will grow and develop on the substrate during fermentation, so that the feed contains probiotics that will be utilized by livestock to help the food digestion process. Astuti *et al*. (2015) reported that probiotics can be given at a concentration of 0.6 v/w in broiler up to 28 days of age. The higher the level ~~of use~~ of the probiotic *Lactobacillis* species~~.~~ in feed the better the effect on the growth (Pradikta *et al.*, 2018). Previously, Mcnaught and MacFie (2000) stated that there are a number of probiotics that

To cite this paper: 1th Author surname A, 2th Author surname B , 3th Author surname C. 2023. Article title should be regular and 7 pt . *J. World Poult. Res.*, Add No. of Volume (Add No. of Issue): 00-00. https://dx.doi.org/10.36380/jwpr.2022.x

Kommentar [P1]: Please mention the type of the study
Kommentar [P2]: The article should be linguistically edited by a native English editor.
The abstract is done as a sample for you.
Formatiert: Links, Tabstopps: 1,67 cm, Links + 6,13 cm, Links
Kommentar [A3]: Indicate the species
Formatiert: Links
Formatiert: Schriftart: Kursiv
Kommentar [P4]: Do you mean broi
Kommentar [P5]: Please rephrase t
Kommentar [P6]: Please write full
Kommentar [P7]: The ORCID of
Kommentar [P8]: The ORCID of
Formatiert: Links
Kommentar [P9]: Please add one
Kommentar [P10]: broiler chickens?
Kommentar [P11]: Do you mean
Kommentar [P12]: How many
Kommentar [BE13]: Feeding what
Kommentar [BE14]: Feeding what
Kommentar [A15]: Indicate the
Formatiert: Schriftart: Kursiv
Formatiert: Schriftart: Kursiv
Kommentar [P16]: How many week
Kommentar [P17]: No need to
Kommentar [BE18]: Which of the
Kommentar [P19]: How many week
Kommentar [P20]: Compared to wh
Kommentar [P21]: Please add a
Kommentar [P22]: We have many
Kommentar [P23]: We have many
Kommentar [P29]: Please add the
Kommentar [P30]: Please add the
Kommentar [P24]: Do you mean
Kommentar [P31]: Please add the
Kommentar [P25]: Please add the
Kommentar [BE26]: Dangling
Kommentar [P32]: Please add the
Kommentar [P27]: The et al should
Formatiert: Schriftart: Nicht Kursiv
Kommentar [a28]: This reference
Kommentar [a33]: This reference

have a strong attachment to intestinal cells, including those from several types of lactic acid bacteria, such as *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus plantarum* and a large number of *Bifidobacteria*. The ability to stick to the digestive tract will cause probiotic microbes to develop properly and pathogenic microbes such as *Eschericia coli* and *Salmonella ~~thyphimurium~~ Typhimurium* in the digestive tract will be reduced from the animal host cells.

The feeding duration of certain feeds will allow probiotics to stick to the digestive tract of poultry for a longer period ~~of time~~, affecting livestock production. The results of the research by Zulfan and Zulfikar (2020); Naji *et al*. (2016) reported that fermented feed ingredients can be given ~~to~~ in commercial rations without disturbing the growth and increasing the income over feed costs of broiler. Feeding broilers at the beginning of growth, namely during the brooding period will affect the growth of broiler DOC. When chicks are 1 to 14 days old, there will be cell multiplication or hyperplasia. The multiplication of these cells includes the development of the digestive tract, ~~tract, the development of the~~ respiratory tract, and ~~the development of the~~ immune system. Body cells will increase in number by way of cell division. The hyperplasia process will affect further growth in the form of hypertropia growth, cells will increase in size or cell maturation (Fatmaningsih *et al*., 2016). The duration of feeding fermented feed to broilers will affect the mechanism of absorption of food substances in the ration, so that broilers can grow with optimal weight and are expected to optimize the resulting body weight gain.

MATERIALS AND METHODS

This study used 160 DOC (~~day~~-day-old chicks) broilers placed in a postal cage measuring 100 cm x 100 cm as many as 16 cages. The feed used during the starter period ~~comes from~~was from PT. Charoen Pokphand, Indonesia, and at the time the finisher, it was ~~came from~~ PT. Cj Cheiljedang Feed Lampung. The composition of the nutrients in the feed used during the study is shown in Table 1.

Table 1. Nutrient composition of feed given at the starter and finisher period in broiler chickens.

Nutrient	Starter ~~F~~feed (HI Pro)*	Finisher ~~F~~feed (MR1 – P)**
Water content (%)	13,00	13,00
Crude ~~P~~protein (%)	22,00 – 23,00	21,50 – 23,00
Crude ~~F~~fiber (%)	5,00	4,00
Fat (%)	5,00	8,00
Ash (%)	7,00	6,50
Cal~~s~~cium (%)	0,90	0,90 – 1,20
Phospor (%)	0,60	0,70 – 1,00
Energy ~~M~~metabolism (kcal/kg)	3,020 – 3,120	2,750 – 2,768

* The feed is produced by ~~PT~~. Charoen Pokphand, Indonesia.
** The feed is produced by PT. Cheil Jedang Super Feed, Lampung.

Before the feed was given to broilers, it was fermented using Superlakto containing *Lactobacillus burlgarius* bacteria for 7 days. The fermentation process was carried out by diluting Superlacto with a concentration of 15~~%~~ percent. Afterwards, it is continued with the process of inoculation of the feed by evenly spraying the inoculant (4% w/v). Furthermore, incubation is carried out for 7 days before being given to broilers.

This research was conducted using a Completely Randomized Design (CRD) consisting of 4 treatments and 4 replications. The treatment in this study was the duration of fermented feed, namely~~:~~ P1 (Feeding fermented feed for 2 weeks), P2 (Feeding fermented feed for 3 weeks), P3 (Feeding fermented feed for 4 weeks), and P4 (Feeding fermented feed for 5 weeks).

Mathematic model of completely randomized design~~:~~
Yij = μ + Ti + εij

i = 1, 2, ……. ,
tj = 1, 2,…… , n
Yij = observation value in treatment i, repetition j
μ = common mean
Ti = effect of treatment i
εij = random effect (trial error) on treatment i and replication j
t = many treatments
n = number of replications

The investigated parameters ~~observed~~ were ~~the performance of broiler chickens which i~~included: ~~(1)~~ ~~C~~consumption of ration (g/head/day) which, was measured based on the difference between the ration given (g) and the rest of the ration given (g) during a certain period (days), ~~(2) B~~body weight gain (g/head/day), which measured by weighing the difference between body weight at the end of the study (g) and the initial body weight (g) then divided by the length of rearing time (days), ~~(3) C~~conversion of rations, which is measured based on the ratio between weight gain and ration consumption. Then measure the quality of the broiler carcass, including: ~~(1)~~ Live weight, which is measured based on the results of weighing at the end of the study (g). ~~(2)~~ Percentage of the carcass (%), which is calculated based on the percentage of weight comparison of broilers without blood, feathers, head, legs, and digestive organs (g) divided by live weight (g). ~~(3)~~ Percentage of abdominal fat (%), which calculated based on the percentage of the comparison between the

Kommentar [P63]: Check the word
Kommentar [A64]: Phosphor
Kommentar [P65]: Change it to
Kommentar [A66]: metabolism Energy
Kommentar [P34]: Please add the
Kommentar [A67]: Full words
Kommentar [P35]: Please add the
Kommentar [P68]: Please check the
Formatiert
Formatiert
Formatiert
Kommentar [BE69]: What is the
Kommentar [BE70]: What was used
Kommentar [P36]: Do you mean on
Kommentar [P37]: Difficult to
Kommentar [BE71]: How was the
Kommentar [P38]: Add the reference.
Kommentar [P72]: Please check the
Kommentar [P73]: Add the referen
Formatiert
Kommentar [P74]: How many chick
Kommentar [P39]: Please add the
Formatiert
Kommentar [a75]: Similarity
Kommentar [P76]: Water and feed
Kommentar [P77]: What about the
Kommentar [P78]: What was the fo
Kommentar [P40]: Please mention
Kommentar [P41]: not related to la
Kommentar [BE42]: So, mention th
Formatiert
Kommentar [P43]: Did you perform
Kommentar [P44]: Please add the
Kommentar [P45]: 160 or 180? You
Kommentar [P46]: where did you
Kommentar [P47]: What was the
Kommentar [P48]: What was the
Kommentar [P79]: No need to
Kommentar [BE80]: Expunge
Kommentar [P49]: In which
Kommentar [P50]: What were the
Kommentar [P51]: What was the
Kommentar [P81]: How many chick
Kommentar [P52]: ? Full word
Kommentar [P53]: Please revise the
Kommentar [P54]: What about
Kommentar [P55]: Please add the
Formatiert
Kommentar [P56]: Add the breed
Kommentar [P57]: Which days/wee
Kommentar [P59]: Which days/wee
Formatiert
Formatiert
Formatiert
Formatiert

weight of abdominal fat contained in the abdominal cavity and fat attached to the digestive organs (g) with the live weight of broilers (g).

Statistical analysis

Data from observation during the study are analyzed by Analysis of Variance (ANOVA). If there is a significant difference, then a further test is carried out using ~~Duncan's~~ Duncan's Multiple Range Test (Stell and Torrie, 1995).

RESULTS AND DISCUSSION

~~Broiler p~~Production performance ~~during the research~~

The average performance of broiler production observed during the research were ration consumption, body weight gain and feed conversion. The data are presented in Table 2.

Kommentar [P82]: Add the reference for the method of these parameters.

Kommentar [A83]: Add the timing of evaluation for these parameters

Kommentar [BE84]: This should come under a subheading such as performance parameters and carcass measurements. All the numbering within the text is not necessary

Kommentar [P85]: Which software did you use for data analysis?
What was the significant level?

Formatiert: Schriftart: Fett

Formatiert: Schriftart: Fett

Formatiert: Schriftart: Fett

Kommentar [a86]: This reference doesn't exist in references part of article

Tgeble 2. ~~Average~~ Production performance of broiler chickens ~~production performance during the study.~~

Treatment	Feed ~~Consumtion~~consumption (g/head/day)	Weight ~~g~~Gain (g/head/day)	Feed ~~c~~Conversion ratio
P1	78,17±3,45[a]	51,83±6,24[a]	1,50±0,22[a]
P2	86,71±4,12[b]	55,55±4,88[a]	1,56±1,45[a]
P3	96,43±3,41[c]	60,28±5,61[b]	1,60±1,03[a]
P4	118,24±2,66[d]	65,80±3,87[b]	1,80±1,56[b]

~~Abst~~ Different superscript letters in the same column~~s~~ showed a significant difference (p ~~P~~<0.05). P1 = fermented feed for 2 weeks, P2 = fermented feed for 3 weeks. P3 = fermented feed for 4 weeks, P4 = fermented feed for 5 weeks~~.~~

Ration ~~c~~Consumption

The results of the analysis of variance revealed that the duration of feeding fermented with *Lactobacillus* had a significant effect (P<0.05) on the consumption of broiler ration. The average consumption of broiler rations during the study ranged from ~~(~~78.17 to ~~-~~118.24 (g/head/day). The longer the feed is fermented, the more the ration consumption increases, this is presumably because the addition of feed fermented with *Lactobacillus* has better palatability, so it is preferred by broilers. Widodo *et al.* (2013) reported the use of fermented feed can be given to a level of 15% in the ration, because the fermented feed provides the aroma, taste, and shape that broiler chickens prefer, thereby increasing the ration consumption.

Further test results showed that the ratio~~n~~ consumption in P1 differed significantly (P<0.05) ~~with~~ from P2. The increase in consumption in each treatment in this study was thought to be due to the duration of feed fermented with *Lactobacillus* addition which could lead to an increase in feed quality. Widodo *et al.* (2013) stated that fermented feed will experience an increase in quality compared to feed that does not undergo a fermentation process. This increase in feed quality is due to the fact that the feed contains *Lactobacillus* which can help speed up the digestive process, thereby increasing feed digestibility. Kompiang (2009) reported that *Lactobacillus* are able to live and develop in the intestines of livestock, produce enzymes, such as proteases and amylase that can help improve digestion, and produce short-chain fatty acids that have antimicrobial properties that maintain the nutritional value in the feed to be absorbed, so that the addition of feed fermented with *Lactobacillus* can improve ration consumption.

The ration consumption in P2 was significantly different from that in P3, it was suspected that the increase in consumption was due to the feed fermented with *Lactobacillus* having palatability and texture favored by livestock. This is presumably due to the lactic acid produced by *Lactobacillus* in the intestine playing a maximum role in getting rid of pathogenic bacteria, so that they do not compete in utilizing the nutrients to be absorbed, thereby maximizing feed digestibility, which has an impact on increasing consumption (Wikanastri *et al.*, 2012).

The consumption of rations at P3 was significantly different from that in P4, it was suspected that feed fermented with *Lactobacillus* could improve palatability. Moreover, those 4-5 weeks of maintenance could increase the number of *Lactobacillus* in the intestine, so that the longer feeding fermented with *Lactobacillus*, the greater the number of *Lactobacillus* in the digestive tract of broilers, this causes ration consumption and feed digestibility to increase. Zainuddin (2006) reported that broiler rations supplemented with *Lactobacillus* could increase palatability, feed consumption, broiler immune system (health), productivity, efficiency, and feed consumption. According to Hardiningsih *et al.* (2006) the benefits of providing *Lactobacillus* in mixed feed to broilers include increasing palatability, maintaining microflora, being useful in increasing digestive enzyme activity, reducing bacterial enzyme activity and ammonia production, increasing ration consumption and digestion, and neutralizing both enterotoxins and toxins and also stimulates the immune system.

Body ~~w~~Weight ~~g~~Gain

The results of the analysis of variance showed that the feed fermented with *Lactobacillus* had a significant effect (P<0.05) on the increase in the body weight of broilers. It is suspected that feed fermented with *Lactobacillus* can increase feed digestibility in the digestive tract. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will have a positive effect on the growth of broilers~~,~~ because *Lactobacillus* bacteria ~~have the ability to~~can break down simple carbohydrates into lactic acid. *Lactobacillus* bacteria can maintain the balance of other good bacteria populations in the small intestine, so that the digestibility of feed improves which affects the increase in body weight of broilers.

The results of further tests showed that the body weight gain of broilers in treatment P1 was not significantly different (P>0.05) with treatment P2, but significantly different (P<0.05) with treatment P3 and P4. This result is thought to be due to the number of *Lactobacillus* in the digestive tract of broiler chickens~~,~~ because the P1 treatment is the same as the P2 treatment, this could be due to a variety of factors. Uzer *et al.* (2013) reported that *Lactobacillus* functions to maintain beneficial microflora in the digestive tract and conversely inhibit the growth of pathogenic bacteria, increase digestive enzyme activity, decrease bacterial enzyme activity and ammonia production, increase food intake and digestion as well as neutralize enterotoxins and stimulate the immune system so that it does not compete in digesting feed.

The body weight gain of broilers in P2 was significantly different from that in P3, it was suspected that feed fermented with *Lactobacillus* was able to protect the digestive tract from pathogenic bacteria and streamline feed consumption. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will

Formatiert: Schriftart: Fett
Formatiert: Schriftart: Fett
Kommentar [P87]: Add breed
Kommentar [A88]: Add age and effects of martials on the brees
Kommentar [P100]: Add p value
Formatiert: Schriftart: 9 Pt., Fett
Formatiert: Schriftart: 9 Pt.
Formatiert: Schriftart: 9 Pt., Fett
Formatiert: Schriftart: 9 Pt.
Formatiert: Schriftart: 9 Pt., Fett
Formatiert: Schriftart: 9 Pt.
Formatiert: Schriftart: 9 Pt., Fett
Formatiert: Schriftart: 9 Pt.
Formatiert: Schriftart: 9 Pt., Fett
Kommentar [P101]: Difficult to understand
Please clarify
Kommentar [P89]: Please replace (,) with (.)
Make it correct in whole the tables.
Kommentar [P90]: Add space before and after ±
Formatiert: Hochgestellt
Kommentar [P91]: Please revise the format of the p value in whole the text.
Lowercase of p
Add space before and after < or >
Kommentar [a92]: Similarity detection, please rephrase it
Kommentar [P93]: in which group and Compare to which group?
Kommentar [A94]: ?
Kommentar [BE102]: tell how the feeding of fermented diet influenced body weight gain
Kommentar [P103]: In which group
Kommentar [a104]: Similarity
Kommentar [BE95]: Take note that
Kommentar [P105]: Change the word
Kommentar [P106]: Which factors?
Kommentar [P96]: Add p value
Kommentar [a107]: Similarity
Kommentar [P108]: Add p value
Kommentar [P97]: Change the
Kommentar [P98]: Refer to what?
Kommentar [BE99]: The feed

have a positive effect on the growth of chickens. *Lactobacillus* bacteria ~~have the ability to~~can break down simple carbohydrates into lactic acid. *Lactobacillus*, in addition to maintaining the digestive tract, ~~and can also maintain and i~~improve~~i~~ng the nutritional value of feed. Body weight gain is closely related to feeding, in terms of quantity related to feeding consumption. if feed consumption is disturbed it will interfere with growth and vice versa, if feed consumption is sufficient, it will increase broiler body weight.

The weight gain of broilers in P1 and P2 treatments was significantly different from that in P3 and P4 treatments. It is suspected that feeding fermented feed with *Lactobacillus* can increase body weight gain due to its ability to suppress pathogenic bacteria, so it does not compete with pathogenic bacteria. Furthermore, it can also increase feed digestibility, which has a good effect on protein digestibility, where feed fermented with *Lactobacillus* produces proteolytic enzymes in the digestive tract which then can help digest protein thereby increasing body weight. ~~Fermented~~ A fermented feed with *lactobacillus* in addition to suppressing pathogenic bacteria can also improve the performance of digestive organs, and stimulate bile, and pancreatic juice so that it affects the body weight gain of broiler chickens. Nurhayati *et al.* (2015) reported that the use of fermented feed in broiler chickens has the function of increasing the work of the digestive organs of broilers, namely stimulating the gallbladder wall to secrete bile and stimulating the secretion of pancreatic juice which contains amylase, lipase, and protease enzymes ~~so as~~ to improve the digestion of feed ingredients such as carbohydrates, fats, and proteins. Thus, ~~T~~the longer ~~the~~ feeding of fermented feed with *Lactobacillus* resulted in better body weight gain.

Ration c~~C~~onversion ratio

The results of the analysis of variance showed that the addition of fermented feed containing *Lactobacillus* had a significant effect (P<0.05) on the conversion of broiler rations. It was reported that ~~Allegedly~~ because the role of fermented *Lactobacillus* in feed is quite good, because the feed provided is efficient in increasing the body weight of broilers. Kiha *et al.* (2012) indicated that *Lactobacillus* in the digestive tract can suppress pathogenic bacteria, so they do not compete in digesting nutrients, and maximize nutrient absorption in the digestive tract. The longer the addition of feed fermented with *Lactobacillus* can increase the body weight gain of broiler chickens, in addition, the increase in body weight of broiler chickens can be influenced by the consumption of feed and the nutritional content contained in the feed or the consumption of nutrients in the feed. The longer the feeding time fermented with *Lactobacillus*, the greater the body weight gain.

Carcass quality ~~of broiler durung of the research~~

The average ~~of~~ carcass quality of broilers during the study observed were live weight, carcass percentage, and abdominal fat percentage. The data are presented in Table 3.

Table 3. Average carcass quality of broiler chickens ~~during the study.~~

Treatment	Live ~~b~~Body ~~w~~Weight (g)	~~Carcas~~Carcass ~~p~~Percentage (%)	Abdomen ~~F~~fat ~~p~~Percentage (%)
P1	1699,50±13,44^{a}	72,02±6,43^{a}	1.24±0.12$_{a}$
P2	1797,50±21,06^{a}	75,02±11,03^{a}	1.32±0.11^{b}
P3	1900,75±20,11^{b}	77,65±5,44^{b}	1.40±0.80^{b}
P4	2002,00±16,37^{c}	78,39±7,18^{b}	1.34±0.32^{b}

^{abc} Different superscript letters in the same column~~s~~ showed a significant difference (p ~~P~~< 0.05). P1 = fermented feed for 2 weeks, P2 = fermented feed for 3 weeks. P3 = fermented feed for 4 weeks, P4 = fermented feed for 5 weeks~~.~~

Live body weight

~~The average live weight obtained in this study ranged between 1699.50-2002.00 gr.~~ The results of the analysis of diversity on the final weight of broiler chickens showed that the duration of feeding fermented with *Lactobacillus* had a significant effect (P <0.05) on the live weight of broiler chickens. It is suspected that *lactobacillus* can produce lactic acid in the digestive tract~~.~~ so that it can lower the pH in the digestive tract. Low pH conditions will multiply good bacteria, allowing for faster nutrient absorption and increased growth, which will affect the live weight of broiler chickens~~.~~ (Akhadiarto, 2010).

Further testing revealed that the live weight of broiler chickens at P1 was not significantly different (P>0.05) from P2, but was significantly different (P<0.05) from P3 and P4 regarding the live weight of broilers. This shows that the effect of feeding time fermented with *lactobacillus* ~~for 2 weeks to 3 weeks gives the same live weight. This was due to the fact that~~because *lactobacillus* activity on the duration of feeding fermented at P1 and P2 gave the ~~same effect, while the duration of feeding fermented with~~ *lactobacillus* for 4 weeks and ~~for~~ 5 weeks could increase live weight higher than P1 and P2. This is presumably because of the length of time *lactobacillus* in the digestive tract is able to increase the surface area of the intestinal villi so that nutrient absorption is better, reducing the growth of pathogenic microorganisms. In line with the research results of Ignatova *et al.* (2009), it was~~is~~ shown ~~that giving a probiotic supplement (*Lactobacillus*) for 5 weeks have a positive effect on increasing the live weight~~ of broilers and livestock products that are safe for consumption.

Kommentar [P109]: This sentence is repetitive. Please delete it

Kommentar [P110]: Add the reference.

Kommentar [P127]: Add breed

Formatiert: Schriftart: Fett

Kommentar [P111]: Please rephrase the sentence.

Kommentar [a112]: Similarity detection, please rephrase it

Kommentar [P113]: Please add the reference.

Kommentar [P114]: Add the p value

Kommentar [P128]: Please replace (,) with (.) Make it correct in whole the tables.

Kommentar [P129]: Add space before and after ±

Kommentar [P115]: Refer to what?

Kommentar [P116]: Change the word

Formatiert: Hochgestellt

Kommentar [P117]: Add the reference

Kommentar [P118]: Add the reference.

Kommentar [P119]: With which bacteria

Formatiert: Schriftart: Kursiv

Kommentar [a130]: Similarity detection, please rephrase it

Kommentar [P131]: In which group and compared to which group?

Kommentar [P132]: Do you mean benefit bacteria?

Kommentar [BE133]: Which further testing

Kommentar [P120]: In which group and compared to which group?

Kommentar [a121]: Similarity ...

Kommentar [P122]: Change the word

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Kursiv

Kommentar [P123]: Add the ...

Kommentar [a124]: This reference ...

Kommentar [a125]: Similarity ...

Kommentar [P126]: Add the reference

Feeding fermented with *lactobacillus* at P2 was significantly different (P<0.05) compared to P3 and P4 on the results of weight of broiler chickens. It is suspected that the duration of feeding fermented with *lactobacillus* for 3 weeks is still in normal conditions to produce live weight. This is because the feed fermented with *lactobacillus* is given only up to 3 weeks~~,~~ so that after more than 3 weeks the lactic acid bacteria produced from the *lactobacillus* fermented feed will be less so that the acidic conditions in the digestive tract are normal. According to Rodriguez *et al.* (2010), the addition of *lactobacillus* in the feed will reduce pH and can increase the number of microorganisms in the digestive tract, accelerating the growth of digestive organs and allowing them to develop optimally. Feeding fermented with *lactobacillus* at 4 weeks and 5 weeks resulted in high body weight gain. It can be assumed that the longer feeding fermented with *lactobacillus* will result in greater body weight.

Feeding fermented feed with *lactobacillus* for 4 weeks was significantly different (P<0.05) compare to~~with~~ feeding fermented feed for 5 weeks. Presumably the longer the feeding is fermented with *lactobacillus*, the more lactic acid bacteria are produced, which function to lower the pH of the digestive tract, facilitating the metabolic process and producing a high body weight. This is in accordance with the opinion of Agustina *et al.* (2007) which indicated that the ~~the~~ use of *lactobacillus* in feed aims to balance the microflora in the digestive tract ~~in order~~ to increase the absorption of nutrients to produce great body weight.

Carcass ~~p~~Percentage

The average percentage of broiler carcass for each treatment during the study can be seen in Table 3. ~~-~~The average percentage of broiler carcasses obtained in this study ranged from 72.02 to ~~-~~78.39%. The results of the analysis of variance on broiler carcasses showed that the addition of feed fermented with *lactobacillus* had a significant effect (P<0.05) on the percentage of broilers. This is ~~due to the fact that~~because ~~the~~ the duration of feeding fermented with *lactobacillus* ~~is able to~~can lower the pH of the digestive tract, and facilitate the work of the pepsin enzyme~~,~~ so that protein absorption increases. Amrullah (2004) stated that the average percentage of broiler carcasses is around 65-78% of the final body weight.

The results of further tests on the percentage of broiler carcasses showed that the percentage of carcasses in P1 was not significantly different (P>0.05) with P2, but significantly different (P<0.05) with P3 and P4. This indicated that the effect of feeding time fermented with *lactobacillus* for 2 weeks and 3 weeks resulted in a carcass percentage of 72.02%-75.02% lower than P3 and P4. This is because feeding fermented with *lactobacillus* for 2 weeks and 3 weeks has the potential for the growth of pathogenic bacteria such as *salmonella* bacteria because fermented feed has a function to minimize the growth of *salmonella* pathogenic bacteria, so that the protein digestion process assisted by enzymes will be slower compared to P3 and P4, while the duration of feeding fermented with *lactobacillus* for 4 weeks to 5 weeks resulted in a higher carcass percentage than P1 and P2, ranging from 77.64% to ~~-~~78.39%. This is because *lactobacillus* acts as a growth promoter which is able to increase the work of the pepsin enzyme in the digestive tract so that the absorption of nutrients in the intestines and the resulting metabolic products can be utilized by the livestock body to form and add new tissues such as meat formation (Ignatova *et al.*, 2009).

Feeding fermented with *lactobacillus* in treatment P2 was significantly different (P>0.05) with P3 and P4 on the percentage of carcasses. This is because the length of time of fermented feed with *lactobacillus* will produce a good percentage of the carcass ~~because~~. After all, *lactobacillus* will produce lactic acid bacteria which function to facilitate the work of the digestive tract, resulting in a high percentage of the carcass. Maunatin and Khanifa (2012) stated that lactic acid bacteria found in the digestive system are able to neutralize toxins produced by pathogenic bacteria, affecting enzyme activity in the small intestine so that nutrients will be circulated by the blood throughout the body to form meat.

Feeding fermented feed with *lactobacillus* at P3 was not significantly different (P>0.05) with P4. ~~The~~ This ~~reason~~ is because ~~because~~ the fermented feed for 4 weeks had the same number of *lactobacillus* bacteria as the fermented feed treatment for 5 weeks, so ~~that~~ the enzyme performance produced was the same in the P3 and P4 treatments. One of the increased enzyme performances due to the increase in the microbial population is the pepsin enzyme to break down protein and then the absorption of feed nutrients will be spread throughout the body to form meat deposition. In line with the research of Mountzouris *et al.* (2010) reported that the use of probiotics in feed can work optimally in the digestive tract by increasing the number of microbial populations, thereby balancing the microflora in the digestive tract, protecting the digestive system, improving intestinal health and increasing livestock productivity.

Abdominal ~~F~~Fat ~~p~~Percentage

The average percentage of abdominal fat weight ranged from 1.24 to 1.40%. It can be assumed that feeding fermented with *lactobacillus* facilitates the hydrolysis of carbohydrates in the digestive tract, facilitating the absorption of glucose and monosaccharides. Meanwhile, feed containing easily digestible carbohydrates will result in increased abdominal fat. In accordance with the view of Jha and Mishra (2021), poultry that are fed carbohydrate-based diets ~~have~~ has a higher abdominal fat content than fibrous, easily digestible carbohydrates ~~have a tendency~~tend to be converted into energy reserves in the form of fat. Hidayat (2015) reported that fat formation

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Nicht Kursiv

Formatiert: Schriftart: Kursiv

Kommentar [BE140]: Please check. P>0.05 shows non-significant differences.

Formatiert: Schriftart: Kursiv

Kommentar [P141]: Change the word

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Kursiv

Kommentar [A134]: Rephrase

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Kursiv

Kommentar [P142]: Difficult to understand
Please clarify.

Kommentar [P135]: percentage of what?

Kommentar [a136]: Similarity detection, please rephrase it

Kommentar [P137]: In which group and compared to which group?

Kommentar [BE138]: Which further test?

Kommentar [BE139]: Feeding fermented what?

Formatiert: Schriftart: Kursiv

occurs due to excess energy consumed. Excess energy in broilers will be stored in the form of abdominal fat.

Further test results revealed that the percentage of abdominal fat given fermented feed with *lactobacillus* at P1 was significantly different (P<0.05) from P2, P3, and P4 in terms of abdominal fat percentage. It is suspected that the duration of feeding fermented with *lactobacillus* at P1 was still in normal condition resulting in a lower percentage of abdominal fat, while at P2, P3, and P4 the length of feeding fermented with *lactobacillus* could reduce the activity of the lipase enzyme that plays a role in the rate of acid synthesis. fat. Fouad and El-Senousey (2014) reported that the decrease in abdominal fat deposition with a decrease in the energy content of the ration was caused by the reduced activity of lipase enzymes associated with lipogen~~et~~ic processes in the liver. Lipogenesis is a fat deposition process ~~which~~ that includes fatty acid synthesis and then triglyceride synthesis that occurs in the liver in the mitochondria and cytoplasm as well as adipose tissue (Pratikno, 2012). Fat in the body originated from feed and is produced from the synthesis process in the liver (Jensen-Urstad and Semenkovich, 2012).– Feeding fermented feed with *lactobacillus* at P2 and P3 was not significantly different (P>0.05) but significantly different from P4. This is presumably because feeding fermented with *lactobacillus* can optimize the absorption of the digestive tract so that the nutritional content of the feed is more directed at the formation of meat and bones than fat in each treatment. Fouad and El-Senousey (2014) stated that nutrition affects the deposition of abdominal fat ~~on~~ in the body of broiler chickens. Reduction of body fat deposits in broilers, including abdominal fat, occurs due to a reduction in fatty acid synthesis in the liver and a decrease in lipase enzyme secretion, thereby reducing fat absorption. Zhang *et al.* (2007) stated that fatty acids reduce the amount of body fat deposition in broilers by suppressing the activity of the lipase enzyme in plasma.

CONCLUSION ~~AND RECOMMENDATIONS~~

According to the findings of the present study~~research~~, adding fermented *Lactobacillus* feed for 5 weeks could increase body weight gain by 16.30%, decrease feed conversion by 11.10% and improve the carcass quality of broiler chicken~~s~~.

Acknowledgments

Authors' contribution

Competing interests

Ethical consideration

Ethical issues (including plagiarism, consent to publish, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy) have been checked by all the authors.

REFERENCES

Agustina L, Purwanti S, dan Zainuddin D. (2007). Penggunaan probiotik Lacobacillus Sp sebagai imbuhan pakan broiler. Seminar Nasional Teknologi Peternakan dan Veteriner, Bogor. 21-22 Agustus 2007.

Akhadiarto S. (2010). Pengaruh pemberian probiotik temban, biovet dan biolacta terhadap persentase karkas bobot lemak abdomen dan organ dalam ayam broiler. Pusat Teknologi Produksi Pertanian, BPPT. Jakarta Pusat.

Amrullah IK. (2004). Nutrisi ayam pedaging. Lembaga Satu Gunung Budi. Bogor.

Astuti FK, Busono W, dan Sjofjan O. (2015). Pengaruh penambahan probiotik cair dalam pakan terhadap penampilan produksi pada ayam pedaging. Indonesian Journal of Enviromental and Sustainable Development, 6-(2) : 99-104. Available at: https://jpal.ub.ac.id/index.php/jpal/article/view/192/195.

Fatmaningsih R, Riyanti, and Nova K. (2016). Performa ayam pedaging pada sistem brooding konvensional dan thermos. Jurnal Ilmiah Peternakan Terpadu, 4(3): 222– 229. DOI: http://dx.doi.org/10.23960/jipt.v4i3.p%25p

Fouad AM. and El-Senousey HK. (2014). Nutritional factors affecting abdominal fat deposition in poultry: A review. Asian-Australasian Journal of Animal Science. 27: 1057-1068. DO~~I~~: https://www.doi.org/10.5713/ajas.2013.13702

Hardiningsih R, Napitupulu RNR, dan Yulinery T. (2006). Isolasi dan uji resistensi beberapa isolat *Lactobacillus* pada pH rendah. Biodiversitas, 7(1): 15-17. DOI: 10.113057/biodiv/d070105.

Hidayat C. (2015). Penurunan deposit lemak abdominal pada ayam pedaging melalui manajemen pakan.balai penelitian ternak. *Wartazoa*. (25)3: 125-134. DOI: http://dxwww.doi.org/10.14334/wartazoa.v25i3.1157.

Ignatova M, Sredkova V, and Marasheva V. (2009). Effect of dietary inclusion of probiotic on chickens performance and some blood indices. *Biotechnology in animal husbandry*. 25 (5-6): 1079-1085. Available at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.900.1285&rep=rep1&type=pdf

Jensen-Urstad AP. and Semenkovick CF. (2012). Fatty acid synthase and liver triglyceride metabolism: Housekeeper or messenger? Biochimca et Biophys Acta (BBA). Molecular and Cell Biology of Lipids. 1821–(5) : 747–753. DOI: https://www.doi.org/10.1016%2Fj.bbalip.2011.09.017.

Jha R. and Mishra P. (2021). Dietary fiber in poultry nutrition and their effects on nutrient utilization, performance, gut health, and on the environment: a A review. Journal of Anaimal Science and Biotechnology. 12: 51. Available at : https://jasbsci.biomedcentral.com/articles/10.1186/s40104-021-00576-0

Khempaka S, Thongkratok R, Okrathok S, and Molee W. (2014). An evaluation of cassava pulp feedstuff fermented with A. Oryzae, on growth performance, nutrient digestibility and carcass quality of broilers. *J Poult Sci*. 51: 71-79. DOI : https://doi.org/10.2141/jpsa.0130022.

Kompiang I.P. (2009). Pemanfaatan mikroorganisme sebagai probiotik untuk meningkatkan produksi ternak unggas di Indonesia. Pengembangan Inovasi Pertanian. 2(3): 177-191.

Kommentar [U152]: Please check one of our published papers or the instructions for authors to revise the references based on journal formatting. http://jwpr.science-line.com/index.php?option=com_content&view=article&id=5&Itemid=4 ========== Please add available DOI in this format. DOI: https://www.doi.org/...

Kommentar [U153]: Revise the nan

Kommentar [U154]: Add link, please.

Kommentar [U155]: Add link, please

Kommentar [U156]: Add DOI or

Kommentar [P143]: Difficult to

Kommentar [P144]: ?

Formatiert

Formatiert: Schriftart: Nicht Kursiv

Kommentar [a145]: This reference

Kommentar [a157]: This doi is not

Feldfunktion geändert

Formatiert

Formatiert: Schriftart: Kursiv

Formatiert

Kommentar [a158]: This doi is not

Kommentar [U159]: The name of th

Kommentar [a160]: This doi is not

Feldfunktion geändert

Kommentar [U161]: It shouldn't be

Formatiert: Schriftart: Kursiv

Formatiert

Feldfunktion geändert

Kommentar [P146]: Add

Kommentar [P147]: Please the sect

Kommentar [P148]: Acknowledgme

Formatiert: Schriftart: Fett

Formatiert: Schriftart: Fett

Feldfunktion geändert

Kommentar [P149]: The role of

Formatiert

Kommentar [P150]: If there is no

Formatiert

Kommentar [U162]: Provide the fu

Kommentar [a163]: This doi is not

Formatiert: Schriftart: Nicht Fett

Kommentar [P151]: Please rephras

Available at: https://docplayer.info/59810085-Pemanfaatan-mikroorganisme-sebagai-probiotik-untuk-meningkatkan-produksi-ternak-unggas-di-indonesia-1.html. Prosiding Seminar Pengembangan Inovasi Pertanian.

Maunatin A, dan Khanifa (2012). Uji potensi probiotik *Lactobacillus plantarium* secara *in-vitro*. *Jurnal Alchemy*, 2(1): 26-34. DOI: https://www.doi.org/10.18860/al.v0i0.2298

Mountzouris KC, Tsitrsikos P, Palamidi I, Arvaniti A, Mohni M, Schatzmayr G, and Fegeros K (2010). Effect of probiotic inclusion level in broiler nutrition on growth performance, nutrient digestibility, plasma imunoglobulins and cecal microflora composition. Poult. Sci. 89(1): 58-67. DOI: https://www.doi.org/10.3382/ps.2009-00308.

Naji SA, Al-Zamili IFB, Hasan, Jawad SAJ, and JKM Al-Gharawi JKM (2016). The effects of fermented feed on broiler production and intestinal morphology. *Pertanika Journal of Tropical Agricultural Science*, 39-(4): 589-599. Available at: http://www.pertanika.upm.edu.my/pjtas/browse/regular-issue?article=JTAS-0825-2015.

Nurhayati, Wirawati, Utami CU, dan Putri DD (2015). Penggunaan produk fermentasi dan kunyit dalam pakan terhadap performa ayam pedaging dan oncome over feed and chick cost. *Jurnal Zootek*, 35(2): 379-389. DOI : https://doi.org/10.35792/zot.35.2.2015.9457.

Pradikta RW, Sofjan O, dan Djunaidi IH (2018). Evaluasi penambahan probiotik (*Lactobacillus* sp) cair dan padat dalam pakan terhadap penampilan produksi ayam petelur. *Jurnal Ilmu Ilmu Peternakan.Indonesian Journal of Animal science*, 28(3): 203-212. DOIAvailable at: https://jiip.ub.ac.id/index.php/jiip/article/view/447.10.2177 6/ub.jiip.2018.028.03.03.

Praktikno H (2012). Lemak abdominal ayam broiler (*Gallus sp.*) karena pengaruh ekstrak kunyit (*Curcuma domestica*). *Jurnal Bioma*, 13(1): 17-24. Available at: https://b2n.ir/d46083.

Rodriguez LJC, Brady J, Camelo JG, Sharif S, Crow G, Ramirez YG, Guenter W, and House JD (2010). Intestinal characterization of avian defesnsins and cytokines after the early administration of probiotic with organic acids in broilers. Avian. Immunol. Res. Group. Budapest, Hungary.

Steel KGD dan Torrie JH (1995). Prinsip dan prosedur statistika. Gramedia. Jakarta.

Uzer F, Iriyanti N, dan Roesdiyanto (2013). Penggunaan pakan fungsional dalam ransum terhadap konsumsi dan pertambahan bobot badan ayam broiler. *Jurnal Ilmiah Peternakan*, 1(1): 282-288. Available at: https://adoc.pub/penggunaan-pakan-fungsional-dalam-ransum-terhadap-konsumsi-p.html.http://jos.unsoed.ac.id/index.php/jip/article/view/589.

Widodo AR, Setiawan H, Sudiyono S, dan Indreswari R (2013). Kecernaan nutrien dan performan puyuh Coturnix coturnix japonica jantan yang diberi ampas tahu fermentasi dalam ransum. *Jurnal Tropical Animal Husbandry*, 2(1): 51-57. https://peternakan.fp.uns.ac.id/wp-content/uploads/2019/08/8-Andrik-et-al-51-57-.pdf

Wikanastri, Suyanto H, Utama A, dan Cahya S (2012). Aplikasi proses fermentasi kulit singkong menggunakan starter asal limbah kubis dan sawi pada pembuatan pakan ternak berpotensi probiotik. Prosiding Seminar Nasional Hasil - Hasil penelitian LPPM UNIMUS. Pppp. 281-288.

Zainuddin D (2006). Tanaman obat meningkatkan efisiensi pakan dan kesehatan ternak unggas. Balai Penelitian Ternak, Bogor.

Zhang X, Roland DA, McDaniel GR, and Roat SK (2005). Effect of *naturphosphytase* supllementation to feed on performance and ileal digestibility of protein and amino acid of broilers. *Poult. Sci.* 49: 215-22378(11): 1567-1572. DOI: https://www.doi.org/ 10.1093/ps/78.11.1567.

Zulfan dan Zulfikar (2020). Performa ayam broiler yang diberi pakan fermentasi campuran jagung, dedak dan tepung limbah ikan Leubim sebagai substitusi sebagian ransum komersial. *Jurnal Ilmiah Ilmu-ilmu Peternakan*, 23(2) : 92-103. Available at: https://online-journal.unja.ac.id/jiip/article/view/10723

Formatiert: Schriftart: 11 Pt., Unterstrichen, Schriftartfarbe: Blau, Hervorheben

Formatiert: Schriftart: 7 Pt.

Kommentar [U174]: Provide the web link, please.

Kommentar [U175]: Please provide the volum, issue, and page numbers. Also add DOI or web link.

Kommentar [U176]: Please provide the issu, volume, and page numbers. Also add DOI or web link.

Feldfunktion geändert

Kommentar [U177]: Full name of the journal please.

Formatiert: Schriftart: 11 Pt., Unterstrichen, Schriftartfarbe: Blau

Formatiert: Absatz-Standardschriftart, Schriftart: (Standard) Times New Roman, Schriftartfarbe: Automatisch, Hervorheben

Kommentar [U164]: Add full name of the journal, please.

Formatiert: Schriftart: 11 Pt., Unterstrichen, Schriftartfarbe: Blau

Kommentar [U178]: Not in italic form.

Feldfunktion geändert

Kommentar [U165]: Not in Italic form

Kommentar [a166]: This doi is not reached

Kommentar [a167]: This doi is not reached

Formatiert: Schriftart: Kursiv

Kommentar [U168]: Not in Italic form.

Formatiert: Schriftartfarbe: Automatisch

Formatiert: Schriftartfarbe: Automatisch

Formatiert: Hervorheben

Formatiert ...

Kommentar [a169]: This doi is not ...

Formatiert ...

Kommentar [U170]: Provide full na ...

Kommentar [U171]: It is not reache ...

Kommentar [a172]: This reference ...

Kommentar [U173]: Not in Italic form.

Formatiert ...

Formatiert ...

Formatiert ...

JWPR
The Journal of World's Poultry Research
SCIENCE LINE Online Publication
Scienceline

Reviewers Guide

PART A: ***Editorial Board***

Manuscript Number:	#185
Title:	The Duration of Feeding Fermented with Lactobacillus in the Ration Towards the Production Performance and Carcass Quality of Broilers
Authors:	Rizki Palupi, Fitri N. L. Lubis , and Muhakka
E-Mail:	palupiarda@yahoo.com

PART B: ***Reviewer Only***

SECTION 1: Comments per Section of Manuscript

General comment:	• The article should be linguistically edited by a native English editor. • We have many types of broiler, for example: broiler ducks, broiler quails. So the type of the broiler should be mentioned in whole the text.
Introduction:	• Some of the sentences should be add the reference and rephrase according to the marginal comment. • Please mention the aim of the study at the end of the introduction.
Methodology:	• Please add the section for ethical approval • What about the control group? • You should compare the results with control group. • Where did you purchase the chicks? • How many chicks divided in each group and replicates? • What was the form of feed? • Water and feed were ad libitum? • What was the breed of chicks? • What was the average of weight of chickens? • How many chicks slaughtered in each group for analysis of these parameters? • How much the temperature and humidity rate of the place where the chickens are kept? • What was the lighting schedule? • Did you perform the vaccination program? • What about nutrient composition of the grower feed? • Please add the nutrient composition of methionine, cysteine, lysine and vitamins Table 1. • Which days/weeks did you consider as starter and finisher. • What was the significant level?

Results and Discussion:	• Some of the sentences should be clarify, rephrase and add the p value according to the marginal comments.
Bibliography/References:	• The reference should be revised according to the journal formatting.
Others:	• The ORCID of authors must be added.
Decision:	Major revisions

SECTION 2 - Please rate the following: ***(1 = Excellent) (2 = Good) (3 = Fair) (4 = poor)***

Originality:	1
Contribution To The Field:	2
Technical Quality:	2
Clarity Of Presentation :	2
Depth Of Research:	2

SECTION 3 - Recommendation: (*Kindly Mark With An X*)

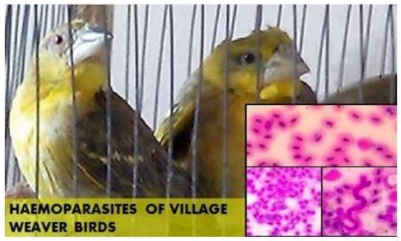
Accept as is	
Requires Minor Corrections:	
Requires Major Revision:	X
Invite Resubmission for a New Review after Major Revisions	
Submit To Another Publication Such As:	
Reject On Grounds Of (Please Be Specific):	

SECTION 4: Additional Comments

Please add any additional comments (Including comments/suggestions regarding online supplementary materials, if any):

SECTION 5: Graphical Abstract

Authors should provide a graphical abstract (a beautifully designed feature figure) to represent the paper aiming to catch the attention and interest of readers. Graphical abstract will be published online in the table of content. The graphical abstract should be *colored*, and kept within an area of 12 cm (width) x 6 cm (height) or with similar format. Image should have a minimum resolution of 300 dpi and line art 1200dpi. Note: *Height of the image should be no more than the width.* **Please avoid putting too much information into the graphical abstract as it occupies only a small space.** Authors can provide the graphical abstract in the format of PDF, Word, PowerPoint, jpg, or png, after a manuscript is accepted for publication. See more sample graphical abstracts in **archive** at (http://jwpr.science-line.com/index.php?option=com_content&view=article&id=2&Itemid=11).



JWPR
The Journal of World's Poultry Research
SCIENCE LINE Online Publication
Scienceline

Reviewers Guide

PART A: ***Editorial Board***

Manuscript Number:	JWPR #185
Title:	The duration of feeding fermented with Lactobacillus in the ration towards the production performance and carcass quality of broilers
Authors:	
E-Mail:	

PART B: ***Reviewer Only***

SECTION 1: Comments per Section of Manuscript

General comment:	The rephrasing of the title should be considered to reflect what the research entails. Check through the manuscript and make necessary corrections and adjustments - There many typos and linguistic errors that must be revised by a native language editor.
Introduction:	The introduction was well written but some statements were not referenced and most importantly, the objective of the research was not clearly spelt out
Methodology:	The presentation and order of arrangement of the methodology should be corrected. The numbering should be removed
Results:	Indicate if the results were presented with Standard deviation or Standard error of mean. The results should be interpreted per Table. Performance is the first one and carcass quality is the second one and therefore parameters under performance should be covered under performance and not listing each parameter under performance as a separate heading and this applies also for carcass
Discussion:	The discussion is too ambiguous. Avoid unnecessary repetitions in discussing the treatments for a parameter. The discussion should be adjusted to be precise as much as possible
Bibliography/References:	Some references are missing
Others:	Check correctly the use of P value in the interpretation of result
Decision:	Consider after revision

SECTION 2 - Please rate the following: ***(1 = Excellent) (2 = Good) (3 = Fair) (4 = poor)***

Originality:	2
Contribution to the Field:	2
Technical Quality:	3
Clarity of Presentation:	3
Depth of Research:	3

SECTION 3 - Recommendation: (*Kindly Mark With An X*)

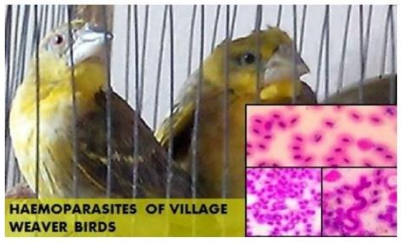
Accept as is	
Requires Minor Corrections:	
Requires Major Revision:	*X*
Invite Resubmission for a New Review after Major Revisions	
Submit to Another Publication such as:	
Reject on Grounds of (Please Be Specific):	

SECTION 4: Additional Comments

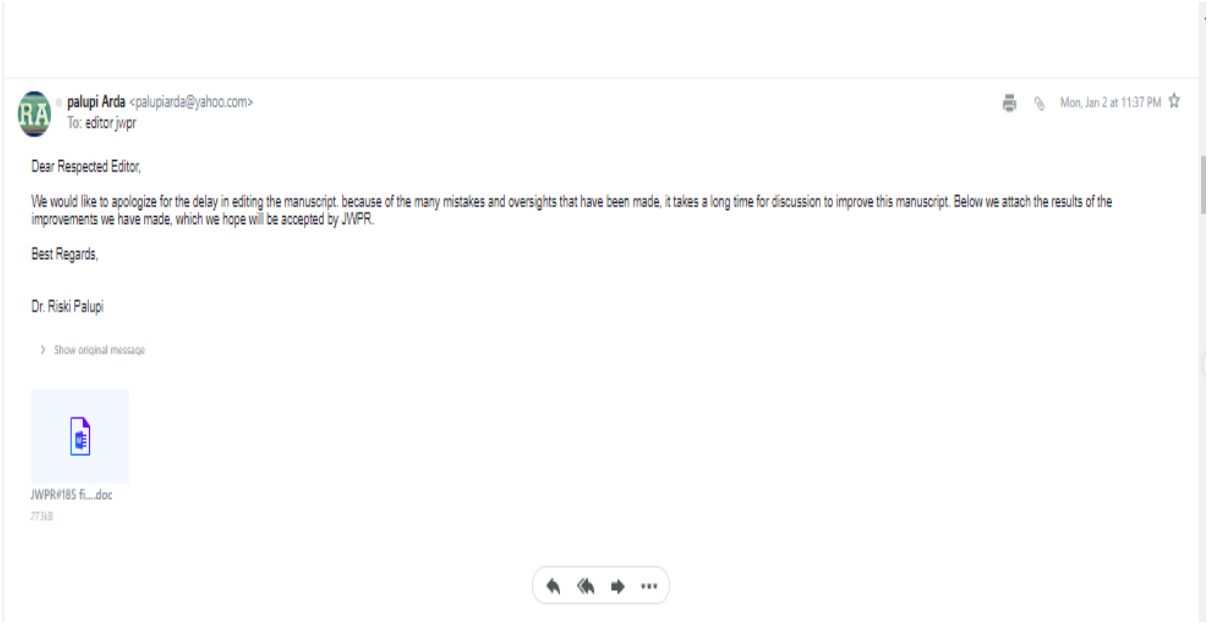
Please add any additional comments (Including comments/suggestions regarding online supplementary materials, if any):

SECTION 5: Graphical Abstract

Authors should provide a graphical abstract (a beautifully designed feature figure) to represent the paper aiming to catch the attention and interest of readers. Graphical abstract will be published online in the table of content. The graphical abstract should be *colored*, and kept within an area of 12 cm (width) x 6 cm (height) or with similar format. Image should have a minimum resolution of 300 dpi and line art 1200dpi. Note: *Height of the image should be no more than the width.* **Please avoid putting too much information into the graphical abstract as it occupies only a small space.** Authors can provide the graphical abstract in the format of PDF, Word, PowerPoint, jpg, or png, after a manuscript is accepted for publication. See more sample graphical abstracts in **archive** at (http://jwpr.science-line.com/index.php?option=com_content&view=article&id=2&Itemid=11).



4. Bukti konfirmasi Submit hasil Revisi Pertama (2 Januari 2022)



palupi Arda <palupiarda@yahoo.com>
To: editor jwpr

Mon, Jan 2 at 11:37 PM

Dear Respected Editor,

We would like to apologize for the delay in editing the manuscript. because of the many mistakes and oversights that have been made, it takes a long time for discussion to improve this manuscript. Below we attach the results of the improvements we have made, which we hope will be accepted by JWPR.

Best Regards,

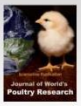
Dr. Riski Palupi

Show original message

JWPR#185 fi....doc
773kB

JWPR
Journal of World's Poultry Research

2022, Scienceline Publication
J. World Poult. Res. 12(1): 00-00, Mar 25, 2022
Research Paper, PII: S2322455X2200000-12



Original Research

The effect of fermented feeding at different times on the Performance of production and the quality of broiler chicken carcasses

Rizki Palupi*, Fitri Nova Liya Lubis, Anggriawan Naidilah Tetra Pratama and Muhakka
Department of Technology and Livestock Industry, Faculty of Agricultural, Sriwijaya University, Indralaya, South Sumatera, Indonesia

*Corresponding author's Email: palupiarda@yahoo.com

Received: xx Mo. 2022
Accepted: xx Mo. 2022

ABSTRACT

The quality of broiler carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production. The study aimed to determine the effect of feeding fermented feed at different times on the production performance and quality of broiler chicken carcasses. The number of Day Old Chick (DOC) used in this study was 180 broiler chickens strain Cobb. This study was carried out experimentally using a Complete Randomized Design consisting of 4 treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); 3 weeks (P2); 4 weeks (P3); and five weeks (P4). Experimental parameters include ration consumption, weight gain, and ration conversion. In addition, the quality of carcasses is also observed: live weight, carcass percentage, and percentage of broiler chicken abdominal fat. The results showed that the longer the time of fermentation feed significantly ($P<0.05$) increased ration consumption by 40.07% and increased 13.77% weight gain, as well as decreased ration conversion by 25.33%. Furthermore, the same results were also shown in the observation of live weight by 17.80% and increased the percentage of the carcass by 8.84% while the percentage of abdominal fat decreased by 12.90%.

Keywords: Broiler, Carcass quality, Fermented feed, Performance

INTRODUCTION

Broiler chickens have a role as a source of animal protein that is in demand by consumers. This demand is because broiler chicken carcasses can be produced faster than other livestock. However, the quality of broiler carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production (Baéza et al., 2022). Various attempts have been made to increase the amount of digested nutrients and increase digestibility by processing feed before consumption. Feed processing that can be pursued is fermenting the feed. One of the feed processing that can be done is by fermenting the feed. The fermentation process can increase feed digestibility and crude protein content and reduce crude fiber in feed (Khempaka et al., 2014). The fermented feed provides several benefits, including improving nutritional properties (reducing fiber and increasing protein content) and intestinal health. It will accelerate broilers' growth (Sugiharto, 2019).

The fermentation process requires an inoculant to speed up the breakdown of nutrients in the feed. One of the inoculants that can be used is by adding *Lactobacillus*. *Lactobacillus* are lactic acid bacteria that are often used in the fermentation process. Lactic acid bacteria will grow and develop on the substrate during fermentation, so the feed contains probiotics utilized by livestock to help the food digestion process. Astuti *et al.* (2015) reported that probiotics could be given at a concentration of 0.6 v/w in broiler up to 28 days of age. The higher the level of the probiotic *Lactobacillus* species in feed, the better the effect on the growth (Pradikta et al., 2018). Previously, Mcnaught and MacFie (2001) stated that many probiotics could attach firmly to intestinal cells, including several types of lactic acid bacteria, such as *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus plantarum,* and large number of *Bifidobacteria*. The ability to stick to the

To cite this paper: 1th Author surname A, 2th Author surname B , 3th Author surname C. 2023. Article title should be regular and 7 pt . *J. World Poult. Res.*. Add No. of Volume (Add No. of Issue): 00-00. https://dx.doi.org/10.36380/jwpr.2022.x

digestive tract will cause probiotic microbes to develop appropriately, and pathogenic microbes such as *Escherichia coli* and *Salmonella Typhimurium* in the digestive tract will be reduced from the animal host cells.
The feeding duration of specific feeds will allow probiotics to stick to poultry's digestive tract for a more extended period, affecting livestock production. The results of the research by Zulfan *et al.* (2020) and Naji *et al*. (2015) reported that fermented feed ingredients could be given in commercial rations without disturbing the growth and increasing the income over feed costs of broiler. Furthermore, feeding in the early phase of growth or during the brooding period can affect the growth of broiler DOC. When chicks are 1 to 14 days old, cell multiplication or hyperplasia will occur. The multiplication of these cells includes the development of the digestive tract, respiratory tract, and immune system. Body cells will increase in number by way of cell division. The hyperplasia process will affect further growth in the form of hypertropia growth, cells will increase in size or cell maturation (Fatmaningsih & Nova, 2016). Based on the description above, a study was aimed to determine the effect of fermented feed at different times on production performance and carcass quality of broiler chickens.

MATERIALS AND METHODS

Animal Ethics

An animal feeding experiment was conducted at the experimental station, Department of Animal Science, Faculty of Agriculture, Universitas Sriwijaya. The birds were cared for according to the Indonesian Institute of Sciences Animal Welfare Guidelines. The approval of the experiment was granted from Universitas Sriwijaya with approval number KPPHP-2021-1.

Method and sampling preparation

This study used 180 DOC (day-old chicks) of Cobb strain broilers with an average weight of 38 g and placed in 20 postal cages with a size of 100 cm x 100 cm. Nine broilers were placed in each cage. The cages had food dishes, water containers, and 60-watt incandescent lamps for lighting and warmth while the chicks were in them. The feed used during the starter period was HI Pro from Incorporated Company Charoen Pokphand, Indonesia, and at the time, the finisher was MR1-P from Incorporated Company Cj Cheiljedang Feed Lampung. The composition of the nutrients in the feed used during the study is shown in Table 1.
Before the feed is given to the experimental animals, the feed is fermented for 7 days using Super lacto which contains the Lactobacillus burlgarius bacteria and is a product of the Central Proteina Prima Tbk company. The fermentation process is carried out by diluting Super lacto at a concentration of 15 percent based on the rules for use on the product label. After that, proceed with the feed inoculation process by spraying the inoculant evenly (4% w/v).

Table 1. Nutrient composition of feed given at the starter and finisher period in broiler chickens strain cobb

Nutrient	Starter feed (HI Pro)*	Finisher feed (MR1 – P)**
Water content (%)	13.00	13.00
Crude protein (%)	22.00 – 23.00	21.50 – 23.00
Crude fibre (%)	5.00	4.00
Fat (%)	5.00	8.00
Ash (%)	7.00	6.50
Calcium (%)	0.90	0.90 – 1.20
Phosphor (%)	0.60	0.70 – 1.00
Metabolism Energy (kcal/kg)	3.020 – 3.120	2.750 – 2.768

* Incorporated Company Charoen Pokphand, Indonesia, produces the feed.
** Incorporated Company Cheil Jedang Super Feed, Lampung produce the feed.

Experimental Design

This research was conducted using a Completely Randomized Design (CRD) consisting of four treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); 3 weeks (P2); 4 weeks (P3); and five weeks (P4).

Observed Variables

All parameters for calculating the value of observations made in this study are based on research conducted by Palupi *et al.* (2022).

Feed Consumption

The investigated parameters included consumption of ration (g/head/day), which was measured based on the difference between the ration given (g) and the rest of the ration given (g) during a specific period (days)

Body weight gain

body weight gain (g/head/day), which was measured by weighing the difference between body weight at the end of the study (g) and the initial body weight (g), then divided by the length of rearing time (days)

Feed Conversion Ratio (FCR)

conversion of rations, measured based on the ratio between weight gain and ration consumption.

Live weight

Then measure, the quality of the broiler carcass, including; Live weight, was measured based on the results of weighing at the end of the study (g).

Carcass percentage

Percentage of the carcass (%), which is calculated based on the percentage of weight comparison of broilers without blood, feathers, head, legs, and digestive organs (g) divided by live weight (g).

Percentage of abdominal fat

Percentage of abdominal fat (%), which is calculated based on the percentage of the comparison between the weight of abdominal fat contained in the abdominal cavity and fat attached to the digestive organs (g) with the live weight of broilers (g).

Statistical Analysis

Analysis of Variance (ANOVA) analyzes data from observation during the study. If there is a significant difference, a further test is carried out using Duncan's Multiple Range Test (Steel & Torrie, 1980).

RESULTS AND DISCUSSION

Production performance

The average Performance of broiler production observed during the research was ration consumption, body weight gain, and feed conversion. The data are presented in Table 2.

Table 2. Production performance at the starter and finisher period in broiler chicken strain cobb

Treatment	Feed consumption (g/head/day)	Weight gain (g/head/day)	Feed conversion ratio
P1	78.17 ± 3.45^{a}	51.83 ± 6.24^{a}	1.50 ± 0.22^{a}
P2	86.71 ± 4.12^{b}	55.55 ± 4.88^{a}	1.56 ± 1.45^{a}
P3	96.43 ± 3.41^{c}	60.28 ± 5.61^{b}	1.60 ± 1.03^{a}
P4	118.24 ± 2.66^{d}	65.80 ± 3.87^{b}	1.80 ± 1.56^{b}

[abc] Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed for 4 weeks, P4 = fermented feed for 5 weeks

Ration consumption

The analysis of variance revealed that the duration of feeding fermented with *Lactobacillus* had a significant effect on the consumption of broiler ration ($P<0.05$). The average consumption of broiler rations during the study ranged from 78.17 to 118.24 (g/head/day). The most extended fermented feed would affect the ration consumption; this was assumed because adding feed fermented with *Lactobacillus* has better palatability, so broilers prefer it. Widodo *et al.* (2013) reported that fermented feed could be given to a level of 15% in the ration, Because fermented feed provides aromas, flavors, and shapes that broilers prefer, thereby increasing ration consumption.

Further test results showed that the consumption ratio of P1 was significantly different from P2 ($P<0.05$). It was hypothesized that the increased consumption at each treatment in this study was due to the duration of the feed fermented with Lactobacillus supplementation, which could lead to improved feed quality. Widodo et al. (2013) found that fermented feed had improved quality compared to feed that had not undergone the fermentation process. This improvement in feed quality is because the feed contains Lactobacillus, which helps speed up the digestive process, thereby improving the digestibility of the feed. Getachew (2016) reported that lactic acid bacteria could live and grow in the intestine and produce enzymes, such as proteases and amylases, which could help improve digestion and produce short-chain fatty acids with antibacterial properties to protect nutritive feed. Therefore, feed intake can be improved by adding feed fermented with lactic acid bacteria.

Feed consumption in P2 was significantly different from P3, suggesting that the increased consumption was due to the palatability of the lactobacillus-fermented feed, which was preferred by livestock. Furthermore, the lactic acid produced by lactobacilli in the gut plays a tremendous role in eliminating pathogenic bacteria and maximizing the digestibility of the feed by ensuring that there is no competition for the utilization of the nutrients ingested. This statement is believed to be due to its impact on consumption (Wikanatsiri et al., 2012).

The consumption of rations at P3 was significantly different from that in P4 ($P<0.05$), it was suspected that feed fermented with *Lactobacillus* could improve palatability. Furthermore, throughout these 4-5 weeks of treatment, the amount of Lactobacillus in the intestine could be increased so that the more extended feeding fermented with *Lactobacillus* caused the more significant population of *Lactobacillus* in the digestive tract of broilers, which caused the ratio consumption and feed digestibility increased. Elbaz (2021) reported that broiler rations supplemented with *Lactobacillus* could increase palatability, feed consumption, broiler immune system (health), productivity, efficiency, and feed consumption. According to Hardiningsih *et al.* (2006), the benefits of providing *Lactobacillus* in mixed feed to broilers were increased palatability; maintaining microflora; helping increase digestive enzyme activity; reducing bacterial enzyme activity and ammonia production; increased ration consumption and digestion; neutralizing both enterotoxins and toxins; and also stimulates the immune system.

Body weight gain

The analysis of variance showed that the feed fermented

with *Lactobacillus* had a significant effect (P<0.05) on the increase in the body weight of broilers. It is suspected that feed fermented with *Lactobacillus* can increase feed digestibility in the digestive tract. Astuti *et al*. (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect broilers' growth because *Lactobacillus* bacteria can break down simple carbohydrates into lactic acid. *Lactobacillus* bacteria can maintain the balance of other beneficial bacteria populations in the small intestine so that feed digestibility improves, affecting the increase in broilers' body weight.

The results of further tests showed that the body weight gain of broilers in treatment P1 was not significantly different (P>0.05) with treatment P2 but significantly different (P<0.05) with treatment P3 and P4. This result is thought to be due to the number of *Lactobacillus* in the digestive tract of broiler chickens because the P1 treatment is the same as the P2 treatment; this could be due to various factors. Uzer *et al.* (2013) Lactobacilli maintain beneficial microflora in the gastrointestinal tract, conversely, suppress the growth of pathogenic bacteria, increase digestive enzyme activity, decrease bacterial enzyme activity and ammonia production, increase food intake and digestion, and enterotoxins and neutralize immunity. A stimulating system that does not compete in digesting food.

The body weight gain of broilers in P2 was significantly different from that in P3; it was suspected that feed fermented with *Lactobacillus* was able to protect the digestive tract from pathogenic bacteria and streamline feed consumption. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect the growth of chickens. *Lactobacillus* bacteria can break down simple carbohydrates into lactic acid. *Lactobacillus*, in addition to maintaining the digestive tract and improving the nutritional value of feed. Body weight gain is closely related to feeding in terms of quantity related to feeding consumption. If feed consumption is disturbed, it will interfere with growth and vice versa; if feed consumption is sufficient, it will increase broiler body weight.

The weight gain of broilers in the P1 and P2 treatments was significantly different from that in P3 and P4 treatments. It is suspected that feeding fermented feed with *Lactobacillus* can increase body weight gain due to its ability to suppress pathogenic bacteria, so it does not compete with pathogenic bacteria. Furthermore, it can also increase feed digestibility, which has a good effect on protein digestibility, where feed fermented with *Lactobacillus* produces proteolytic enzymes in the digestive tract, which then can help digest protein, thereby increasing body weight. A fermented feed with *Lactobacillus,* suppressing pathogenic bacteria, can also improve the Pof digestive organs, stimulating bile and pancreatic juice so that it affects the body weight gain of broiler chickens. Nurhayati *et al.* (2015) reported that the use of fermented feed in broiler chickens has the function of increasing the work of the digestive organs of broilers, namely stimulating the gallbladder wall to secrete bile and stimulating the secretion of pancreatic juice, which contains amylase, lipase, and protease enzymes to improve the digestion of feed ingredients such as carbohydrates, fats, and proteins. Thus, the more extended feeding of fermented feed with *Lactobacillus* resulted in better body weight gain.

Ration conversion ratio

The analysis of variance showed that the addition of fermented feed containing *Lactobacillus* had a significant effect (P<0.05) on the conversion of broiler rations. It was reported that the role of fermented *Lactobacillus* in feed is quite good because the feed provided is efficient in increasing the body weight of broilers. Kiha *et al.* (2012) indicated that *Lactobacillus* in the digestive tract could suppress pathogenic bacteria, so they do not compete in digesting nutrients and maximize nutrient absorption in the digestive tract. The longer the addition of feed fermented with *Lactobacillus* can increase the body weight gain of broiler chickens; in addition, the increase in body weight of broiler chickens can be influenced by the consumption of feed and the nutritional content contained in the feed or the consumption of nutrients in the feed. The longer the feeding time fermented with *Lactobacillus*, the greater the body weight gain.

Carcass quality

The average carcass quality of broilers during the study observed was live weight, carcass percentage, and abdominal fat percentage. The data are presented in Table 3.

Table 3. Average carcass quality of broiler chickens

Treatment	Live body weight (g)	Carcass percentage (%)	Abdomen fat percentage (%)
P1	1699.50 ± 13.44[a]	72.02 ± 6.43[a]	1.24 ± 0.12$_a$
P2	1797.50 ± 21.06[a]	75.02 ± 11.03[a]	1.32 ± 0.11[b]
P3	1900.75 ± 20.11[b]	77.65 ± 5.44[b]	1.40 ± 0.80[b]
P4	2002.00 ± 16.37[c]	78.39 ± 7.18[b]	1.34 ± 0.32[b]

[abc] Different superscript letters in the same column showed a significant difference (p < 0.05). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed four weeks, P4 = fermented feed five weeks

Live body weight

The average live weight obtained in this study ranged between 1699.50-2002.00 gr. The results of the analysis of diversity on the final weight of broiler chickens showed that the duration of feeding fermented with *Lactobacillus*

had a significant effect (P <0.05) on the live weight of broiler chickens. It is suspected that *Lactobacillus* can produce lactic acid in the digestive tract so that it can lower the pH in the digestive tract. Low pH conditions will multiply benefical bacteria, allowing for faster nutrient absorption and increased growth, affecting broiler chickens' live weight (Akhadiarto, 2010).

Further testing revealed that the live weight of broiler chickens at P1 was not significantly different (P>0.05) from P2 but was significantly different (P<0.05) from P3 and P4 regarding the live weight of broilers. This result shows that the effect of feeding time fermented with *Lactobacillus* for two weeks to three weeks gives the same live weight. This case was because *lactobacillus* activity on the duration of feeding fermented at P1 and P2 gave the same effect while feeding fermented with *Lactobacillus* for four weeks and five weeks could increase live weight higher than P1 and P2. This result is presumably because of the length of time *Lactobacillus* in the digestive tract can increase the intestinal villi's surface areas, so that nutrient absorption is better, reducing the growth of pathogenic microorganisms. In line with the research results of Ignatova *et al.* (2009), it was shown that giving a probiotic supplement (*Lactobacillus*) for five weeks positively increases the live weight of broilers and livestock products that are safe for consumption.

Feeding fermented with *Lactobacillus* at P2 was significantly different (P<0.05) compared to P3 and P4 on the results of the weight of broiler chickens. It is suspected that the duration of feeding fermented with *Lactobacillus* for three weeks is still in average conditions to produce a live weight. Moreover, because the feed fermented with *Lactobacillus* is given only up to 3 weeks, after more than three weeks, the lactic acid bacteria produced from the *lactobacillus* fermented feed will be less so that the acidic conditions in the digestive tract are normal. According to Rodriguez *et al.* (2010), adding Lactobacillus to the feed will reduce pH and increase the number of microorganisms in the digestive tract, accelerating the growth of digestive organs and allowing them to develop optimally. Feeding fermented with *Lactobacillus* at four weeks and five weeks resulted in high body weight gain. It can be assumed that the more extended feeding fermented with *Lactobacillus* will result in greater body weight.

Feeding fermented feed with *Lactobacillus* for four weeks was significantly different (P<0.05) compared to feeding fermented feed for five weeks. Presumably, the longer the feeding is fermented with Lactobacillus, the more lactic acid bacteria are produced, which lower the digestive tract's pH, facilitating the metabolic process and producing a high body weight. This case follows the opinion of Elbaz *et al.* (2021), which indicated that the use of *Lactobacillus* in feed aims to balance the microflora in the digestive tract to increase the absorption of nutrients to produce ideal body weight.

Carcass percentage

The average percentage of broiler carcass for each treatment during the study can be seen in Table 3. The average percentage of broiler carcasses obtained in this study ranged from 72.02 to 78.39%. The results of the analysis of variance on broiler carcasses showed that the addition of feed fermented with *Lactobacillus* had a significant effect (P<0.05) on the percentage carcasses of broilers. This result was because the duration of feeding fermented with *Lactobacillus* can lower the pH of the digestive tract and facilitate the work of the pepsin enzyme so that protein absorption increases. Baeza *et al.* (2022) stated that the average percentage of broiler carcasses is around 65-78% of the final body weight.

The results of further tests on the percentage carcasses of broiler carcasses showed that the percentage of carcasses in P1 was not significantly different (P>0.05) with P2 but significantly different (P<0.05) with P3 and P4. This result indicated that the effect of feeding fermented feed with *Lactobacillus* for two weeks and three weeks resulted in a carcass percentage of 72.02%-75.02% lower than P3 and P4. This case was because feeding fermented with *Lactobacillus* for two weeks and three weeks has the potential for the growth of pathogenic bacteria such as *salmonella* bacteria because the fermented feed has a function to minimize the growth of *salmonella* pathogenic bacteria so that the protein digestion process assisted by enzymes will be slower compared to P3 and P4, while the duration of feeding fermented with *Lactobacillus* for four weeks to 5 weeks resulted in a higher carcass percentage than P1 and P2, ranging from 77.64% to 78.39%. On This case was because *Lactobacillus* acts as a growth promoter which can increase the work of the pepsin enzyme in the digestive tract so that the absorption of nutrients in the intestines and the resulting metabolic products can be utilized by the livestock body to form and add new tissues such as meat formation (Ignatova et al., 2009).

Feeding fermented with *Lactobacillus* in treatment P2 was significantly different (P<0.05) with P3 and P4 on the percentage of carcasses. This case is because the length of time of fermented feed with *Lactobacillus* will produce a great percentage of the carcass. After all, *Lactobacillus* will produce lactic acid bacteria, which facilitate the work of the digestive tract, resulting in a high percentage of the carcass. Maunatin and Khanifa (2012) stated that lactic acid bacteria found in the digestive system could neutralize toxins produced by pathogenic bacteria, affecting enzyme activity in the small intestine so that the blood will circulate nutrients throughout the body to form meat.

Feeding fermented feed with *Lactobacillus* at P3 was not significantly different (P>0.05) with P4. This case was because the four-week fermented feed had the same number of *lactobacillus* bacteria as the fermented feed treatment for five weeks, so the enzyme performance produced was the same in the P3 and P4 treatments. One of the increased enzyme performances due to the increase in the microbial population is the pepsin enzyme to break

down protein. Then feed nutrients will be absorbed throughout the body to form meat deposition. In line with the research of Mountzouris *et al.* (2010) reported that the use of probiotics in feed can work optimally in the digestive tract by increasing the number of microbial populations, thereby balancing the microflora in the digestive tract, protecting the digestive system, improving intestinal health and increasing livestock productivity.

Abdominal fat percentage

The average percentage of abdominal fat weight ranged from 1.24 to 1.40%. It can be assumed that feeding fermented with *Lactobacillus* facilitates the hydrolysis of carbohydrates in the digestive tract, facilitating the absorption of glucose and monosaccharides. Meanwhile, feed containing easily digestible carbohydrates will result in increased abdominal fat. Following the view of Jha and Mishra (2021), poultry-fed carbohydrate-based diets have a higher abdominal fat content than fibrous; easily digestible carbohydrates tend to be converted into energy reserves in the form of fat. Hidayat (2015) reported that fat formation occurs due to excess energy consumed. Excess energy in broilers will be stored in the form of abdominal fat.

Further test results revealed that the percentage of abdominal fat given fermented feed with *Lactobacillus* at P1 was significantly different ($P<0.05$) from P2, P3, and P4 in terms of abdominal fat percentage. It is suspected that the feeding duration fermented with *Lactobacillus* at P1 was still in normal condition resulting in a lower percentage of abdominal fat. In contrast, at P2, P3, and P4, the length of feeding fermented with *Lactobacillus* could reduce the activity of the lipase enzyme that plays a role in the rate of acid synthesis. Fat. Fouad and El-Senousey (2014) reported that the decrease in abdominal fat deposition with a decrease in the energy content of the ration was caused by the reduced activity of lipase enzymes associated with lipogenic processes in the liver. Lipogenesis is a fat deposition process that includes fatty acid synthesis and triglyceride synthesis that occurs in the liver in the mitochondria, cytoplasm, and adipose tissue. Fat in the body originates from feed and is produced from the synthesis process in the liver (Jensen-Urstad & Semenkovich, 2012). Feeding fermented feed with *Lactobacillus* at P2 and P3 was not significantly different ($P>0.05$) but significantly different from P4. In this case, presumably because feeding fermented with *Lactobacillus* can optimize the absorption of the digestive tract so that the nutritional content of the feed is more directed at the formation of meat and bones than fat in each treatment. Fouad and El-Senousey (2014) stated that nutrition affects the deposition of abdominal fat in the body of broiler chickens. Reduction of body fat deposits in broilers, including abdominal fat, occurs due to a reduction in fatty acid synthesis in the liver and a decrease in lipase enzyme secretion, thereby reducing fat absorption. Zhang *et al.* (1999) stated that fatty acids reduce the amount of body fat deposition in broilers by suppressing the activity of the lipase enzyme in plasma.

CONCLUSION

According to the present study's findings, adding fermented *Lactobacillus* feed for five weeks could increase body weight gain by 16.30%, decrease feed conversion by 11.10% and improve the carcass quality of broiler chickens.

Acknowledgments

We would like to thank the Incorporated Company Satwa Utama Integrasi as a funding source; and Apriadi, Epanria, and Rafi Megansyah for their assistance during the research.

Authors' contribution

All authors developed the theory and supervised the research. Rizki Palupi contributed to the sample collection and analysis calculations. All authors read and approved the final version of the manuscript for publishing in the present journal.

Competing interests

The authors have declared that no competing interest exists

Ethical consideration

All authors have reviewed the manuscripts for ethical concerns, such as plagiarism, consent to publish, misconduct, data fabrication and falsification, double publishing and submission, and redundancy.

REFERENCES

Akhadiarto, S. (2010). Pengaruh Pemberian Probiotik Temban, Biovet Dan Biolacta Terhadap Persentase Karkas, Bobot Lemak Abdomen Dan Organ Dalam Ayam Broiler. *Jurnal Sains Dan Teknologi Indonesia*, *12*(1), 53–59. https://doi.org/10.29122/jsti.v12i1.851

Astuti, F K, Busono, W., & Sjofjan, O. (2015). The effect of liquid probiotics in broiler feed for broiler production performance. *EnviIndonesian Journal of Evironment and Sustainable Development*, *6*(2), 99–104. http://repository.ub.ac.id/159019/

Astuti, Farida Kusuma, Busono, W., & Sjofjan, O. (2015). Pengaruh Penambahan Probiotik Cair dalam Pakan Terhadap Penampilan Produksi Pada Ayam Pedaging. *Pembangunan Dan Alam Lestari*, *6*(2), 99–104. https://jpal.ub.ac.id/index.php/jpal/article/view/192/195

Baéza, E., Guillier, L., & Petracci, M. (2022). Review: Production factors affecting poultry carcass and meat quality attributes. *Animal*, *16*(xxxx). https://doi.org/10.1016/j.animal.2021.100331

Elbaz, A. M. (2021). Effects of Diet Containing Fermented Canola Meal on Performance, Blood Parameters, and Gut Health of Broiler Chickens.

Journal of World's Poultry Research, *11*(1), 01–07. https://doi.org/10.36380/jwpr.2021.1

Fatmaningsih, R., & Nova, K. (2016). Broiler Performance in Conventional Brooding System and Thermos. *Jurnal Ilmiah Peternakan Terpadu*, *4*(3), 222–229.

Fouad, A. M., & El-Senousey, H. K. (2014). Nutritional factors affecting abdominal fat deposition in poultry: A review. *Asian-Australasian Journal of Animal Sciences*, *27*(7), 1057–1068. https://doi.org/10.5713/ajas.2013.13702

Getachew, T. (2016). A Review on Effects of Probiotic Supplementation in Poultry Performance and Cholesterol Levels of Egg and Meat. *Journal of World's Poultry Research*, *6*(61), 31–36. http://jwpr.science-line.com/

Hardiningsih, R., Napitupulu, R. N. R., & Yulinery, T. (2006). Journal Of Biology Diversity. In *Biodiversitas* (Vol. 7, Issue 1, pp. 15–17).

Hidayat, C. (2015). Reducing Abdominal Fat Deposition in Broiler Through Feeding Management. *Indonesian Bulletin of Animal and Veterinary Sciences*, *25*(3), 125–134. https://doi.org/10.14334/wartazoa.v25i3.1157

Ignatova, M., Sredkova, V., & Marasheva, V. (2009). Effect of Dietary Inclusion of Probiotic on Chickens Performance and Some Blood Indices. *Biotechnology in Animal Husbandry*, *25*(6), 1079–1085. http://scindeks.ceon.rs/article.aspx?artid=1450-915609060791

Jensen-Urstad, A. P. L., & Semenkovich, C. F. (2012). Fatty acid synthase and liver triglyceride metabolism: Housekeeper or messenger? *Biochimica et Biophysica Acta - Molecular and Cell Biology of Lipids*, *1821*(5), 747–753. https://doi.org/10.1016/j.bbalip.2011.09.017

Jha, R., & Mishra, P. (2021). Dietary fiber in poultry nutrition and their effects on nutrient utilization, performance, gut health, and on the environment: a review. *Journal of Animal Science and Biotechnology*, *12*(1), 1–16. https://doi.org/10.1186/s40104-021-00576-0

Khempaka, S., Thongkratok, R., Okrathok, S., & Molee, W. (2014). An evaluation of cassava pulp feedstuff fermented with a. oryzae, on growth performance, nutrient digestibility and carcass quality of broilers. *Journal of Poultry Science*, *51*(1), 71–79. https://doi.org/10.2141/jpsa.0130022

Kiha, A. F., Murningsih, W., & Tristiarti. (2012). Pengaruh Pemeraman Ransum dengan Sari Daun Pepaya terhadap Kecernaan Lemak dan Energi Metabolis Ayam Broiler. *Animal Agricultural Journal*, *1*(1), 265–276.

Maunatin, A., & Khanifa, K. (2012). UJI POTENSI PROBIOTIK Lactobacillus plantarium SECARA IN-VITRO. *ALCHEMY*, *2*(1), 26–34. https://doi.org/10.18860/al.v0i0.2298

McNaught, C. E., & MacFie, J. (2001). Probiotics in clinical practice: A critical review of the evidence. *Nutrition Research*, *21*(1–2), 343–353. https://doi.org/10.1016/S0271-5317(00)00286-4

Mountzouris, K. C., Tsitrsikos, P., Palamidi, I., Arvaniti, A., Mohnl, M., Schatzmayr, G., & Fegeros, K. (2010). Effects of probiotic inclusion levels in broiler nutrition on growth performance, nutrient digestibility, plasma immunoglobulins, and cecal microflora composition. *Poultry Science*, *89*(1), 58–67. https://doi.org/10.3382/ps.2009-00308

Naji, S. A. H., Al-Gharawi, J. K. M., & Al-Zamili, I. F. B. (2015). The effect of starting age of feeding wetting fermented feed on the intestinal flora, humoral and cellular immunity of broiler chicks. *International Journal of Advanced Research*, *3*(1), 41–49.

Nurhayati, Wirawati, C. U., & Putri, D. D. (2015). Penggunaan Produk Fermentasi Dan Kunyit Dalam Pakan Terhadap Performan Ayam Pedaging Dan Income Over Feed and Chick Cost. *Zootec*, *35*(2), 379. https://doi.org/10.35792/zot.35.2.2015.9457

Palupi, R., Lubis, F. N. L., & Pratama, A. N. T. (2022). The effect of the use of cassava tuber (Manihot esculenta) and Indigofera zollingeriana leaf flour combination as a source of energy supplemented with citric acid in ration on broiler small intestine characteristics and productivity. *Journal of Advanced Veterinary and Animal Research*, *9*(3), 471–480. https://doi.org/10.5455/javar.2022.i616

Pradikta, R. W., Sjofjan, O., & Djunaidi, I. H. (2018). Evaluasi penambahan probiotik (Lactobacillus sp) cair dan padat dalam pakan terhadap penampilan produksi ayam petelur. *Jurnal Ilmu-Ilmu Peternakan*, *28*(3), 203. https://doi.org/10.21776/ub.jiip.2018.028.03.03

Rodríguez-Lecompte, J. C., Brady, J., Camelo-Jaimes, G., Sharif, S., Crow, G., Ramirez-Yanez, G., Guenter, W., & House, J. D. (2010). Intestinal characterization of avian defensins and cytokines after the early administration of probiotic with organic acids in broilers. *Avian Immunology Research Group. Budapest, Hungary*.

Steel, R. G. D., & Torrie, J. H. (1980). *Principles and procedures of statistics.* McGraw-Hill.

Sugiharto, S. (2019). A review on fungal fermented cassava pulp as a cheap alternative feedstuff in poultry ration. *Journal of World's Poultry Research*, *9*(1), 1–6. https://doi.org/10.36380/jwpr.2019.0

Uzer, F., Iriyanti, N., & Roesdiyanto, R. (2013). The Use of Functional Feed In Rations on Consumtion and Body Weight Gain Broiler. *Jurnal Ilmiah Peternakan*, *1*(1), 282–288.

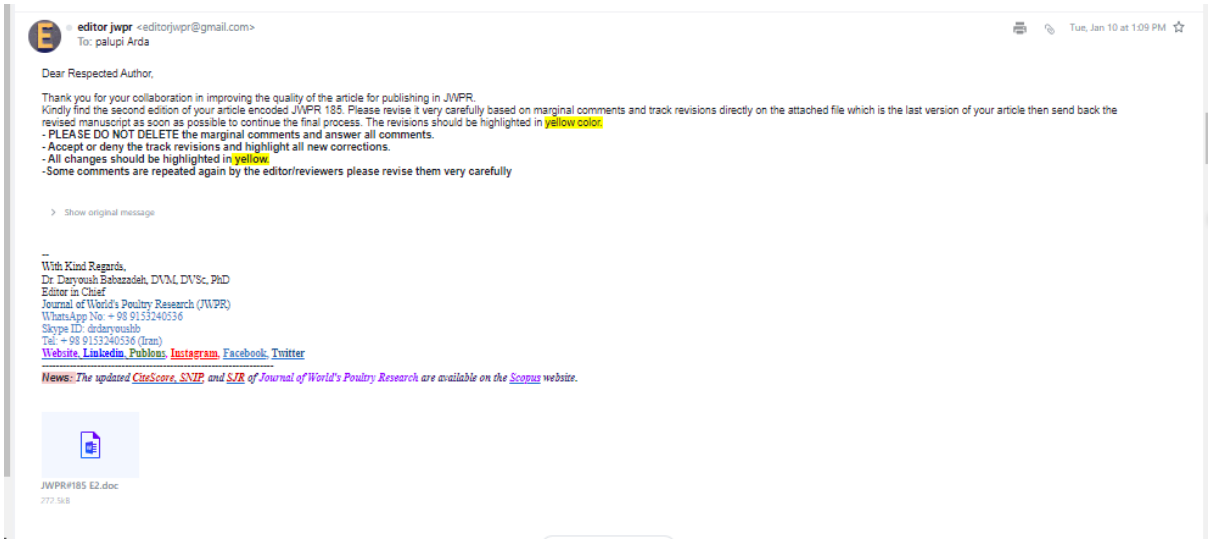
Widodo, A. R., Setiawan, H., & dan Indreswari, S. R. (2013). Kecernaan Nutrien dan Performan Puyuh (Coturnix coturnix japonica) Jantan yang Diberi Ampas Tahu Fermentasi dalam Ransum. *Tropical Animal Husbandry*, *2*(1), 51–57.

Wikanatsiri, Utama, C. S., & Suyanto, A. (2012). Aplikasi Proses Fermentasi Kulit Singkong Menggunakan Stater Asal Limbah Kubis dan Sawi pada Pembuatan Pakan Ternak Berpotensi Probiotik. *Seminar Hasil Penelitian LPPM Universitas Muhammadiyah Semarang*, 281–288.

Zhang, X., Roland, D. A., Mcdaniel, G. R., & Rao, S. K. (1999). Effect of natuphos® phytase supplementation to feed on performance and ileal digestibility of protein and amino acids of broilers. *Poultry Science*, *78*(11), 1567–1572. https://doi.org/10.1093/ps/78.11.1567

Zulfan, & Zulfikar. (2020). Performances of Broilers Fed the Commercial Diet Partly Substituted by Fermented Feed Based onthe Mixing of Corn, Rice Bran, and Leubim Fish (Canthidermis maculata) Processing By-Product Meal. *Jurnal Ilmiah Ilmu-Ilmu Peternakan*, *23*(12), 92–103.

5. Bukti konfirmasi Hasil review kedua (10 Januari 2022)



editor jwpr <editorjwpr@gmail.com>
To: palupi Arda

Tue, Jan 10 at 1:09 PM

Dear Respected Author,

Thank you for your collaboration in improving the quality of the article for publishing in JWPR.
Kindly find the second edition of your article encoded JWPR 185. Please revise it very carefully based on marginal comments and track revisions directly on the attached file which is the last version of your article then send back the revised manuscript as soon as possible to continue the final process. The revisions should be highlighted in yellow color.
- PLEASE DO NOT DELETE the marginal comments and answer all comments.
- Accept or deny the track revisions and highlight all new corrections.
- All changes should be highlighted in yellow
-Some comments are repeated again by the editor/reviewers please revise them very carefully

Show original message

--
With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

News: *The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.*

JWPR#185 E2.doc
272.5kB

JWPR
Journal of World's Poultry Research

2022, Scienceline Publication
J. World Poult. Res. 12(1): 00-00, Mar 25, 2022
Research Paper, PII: S2322455X2200000-12

Original Research

The Effect of Fermented Feeding at Different Times on The Performance of Production and of Carcasses Quality of Broiler Chickens

Kommentar [P1]: Please check and confirm the title

Rizki Palupi*, Fitri Nova Liya Lubis, Anggriawan Naidilah Tetra Pratama, and Muhakka
Department of Technology and Livestock Industry, Faculty of Agricultural, Sriwijaya University, Indralaya, South Sumatera, Indonesia

*Corresponding author's Email: palupiarda@yahoo.com

Received: xx Mo. 2022
Accepted: xx Mo. 2022

ABSTRACT

The quality of broiler chicken's carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production. The study aimed to determine the effect of feeding fermented feed at different times on the production performance and quality of broiler chicken carcasses. The number of Day Old Chick (DOC) used in this study was 180 broiler chickens strain Cobb. This study was carried out experimentally using a Complete Randomized Design consisting of 4 treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely –feeding for two weeks (P1); 3 weeks (P2); 4 weeks (P3); and five weeks (P4). Experimental parameters include ration consumption, weight gain, and ration conversion. In addition, the quality of carcasses is also observed: live weight, carcass percentage, and percentage of broiler chicken abdominal fat. The results showed that the longer the time of fermentation feed significantly ~~(P<0.05)~~ increased ration consumption by 40.07% and increased 13.77% weight gain, as well as decreased ration conversion by 25.33%. Furthermore, the same results were also shown in the observation of live weight by 17.80% and increased the percentage of the carcass by 8.84% while the percentage of abdominal fat decreased by 12.90%.

Kommentar [P2]: Please add a sentence for conclusion to show the value of your study at the end of the abstract.

Keywords: Broiler chicken, Carcass quality, Fermented feed, Performance

INTRODUCTION

Broiler chickens have a role as a source of animal protein that is in demand by consumers. This demand is because broiler chicken carcasses can be produced faster than other livestock. However, the quality of broiler carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production (Baéza et al., 2022). Various attempts have been made to increase the amount of digested nutrients and increase digestibility by processing feed before consumption. Feed processing that can be pursued is fermenting the feed. One of the feed processing that can be done is by fermenting the feed. The fermentation process can increase feed digestibility and crude protein content and reduce crude fiber in feed (Khempaka et al., 2014). The fermented feed provides several benefits, including improving nutritional properties (reducing fiber and increasing protein content) and intestinal health. It will accelerate broiler chickens~~'~~ growth (Sugiharto, 2019).

The fermentation process requires an inoculant to speed up the breakdown of nutrients in the feed. One of the inoculants that can be used is by adding *Lactobacillus*. *Lactobacillus* are lactic acid bacteria that are often used in the fermentation process. Lactic acid bacteria will grow and develop on the substrate during fermentation, so the feed contains probiotics utilized by livestock to help the food digestion process. Astuti *et al*. (2015) reported that probiotics could be given at a concentration of 0.6 √w in broiler up to 28 days of age. The higher the level of the probiotic –*Lactobacillus* species in feed, the better the effect on the growth (Pradikta et al., 2018). Previously, Mcnaught and MacFie (2001) stated that many probiotics could attach firmly to intestinal cells, including several types of lactic acid bacteria, such as *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus plantarum,* and large number of *Bifidobacteria*. The ability to stick to the

Kommentar [P3]: Add the reference

Kommentar [P4]: Add the reference.

Kommentar [P5]: Add the reference.

Kommentar [P6]: Not italic
Please check and revise it in whole the text.

To cite this paper: 1th Author surname A, 2th Author surname B , 3th Author surname C. 2023. Article title should be regular and 7 pt . *J. World Poult. Res.*, Add No. of Volume (Add No. of Issue): 00-00. https://dx.doi.org/10.36380/jwpr.2022.x

digestive tract will cause probiotic microbes to develop appropriately, and pathogenic microbes such as *Escherichia coli* and *Salmonella Typhimurium* in the digestive tract will be reduced from the animal host cells. The feeding duration of specific feeds will allow probiotics to stick to poultry's digestive tract for a more extended period, affecting livestock production. The results of the research by Zulfan *et al.* (2020) and Naji *et al.* (2015) reported that fermented feed ingredients could be given in commercial rations without disturbing the growth and increasing the income over feed costs of broiler. Furthermore, feeding in the early phase of growth or during the brooding period can affect the growth of broiler DOC. When chicks are 1 to 14 days old, cell multiplication or hyperplasia will occur. The multiplication of these cells includes the development of the digestive tract, respiratory tract, and immune system. Body cells will increase in number by way of cell division. The hyperplasia process will affect further growth in the form of hypertropia growth, cells will increase in size or cell maturation (Fatmaningsih and ~~&~~ Nova, 2016). Based on the description above, a study was aimed to determine the effect of fermented feed at different times on production performance and carcass quality of broiler chickens.

MATERIALS AND METHODS

Ethical approval~~Animal Ethics~~

An animal feeding experiment was conducted at the experimental station, Department of Animal Science, Faculty of Agriculture, Universitas Sriwijaya. The birds were cared for according to the Indonesian Institute of Sciences Animal Welfare Guidelines. The approval of the experiment was granted from Universitas Sriwijaya with approval number KPPHP-2021-1.

Method and sampling preparation

This study used 180 one-day-old chicks ~~DOC~~ (DOC~~day-old chicks~~) of Cobb strain broilers with an average weight of 38 g and placed in 20 postal cages with a size of 100 cm x 100 cm. Nine broilers were placed in each cage. The cages had food dishes, water containers, and 60-watt incandescent lamps for lighting and warmth while the chicks were in them. The feed used during the starter period was HI Pro ~~from Incorporated (Company~~ Charoen Pokphand, Indonesia), and at the time, the finisher was MR1-P ~~(from Incorporated Company~~ Cj Cheiljedang ~~Feed~~, Indonesia) ~~Lampung~~. The composition of the nutrients in the feed used during the study is shown in Table 1.

Before the feed is given to the experimental animals, the feed is fermented for 7 days using Super lacto which contains the *Lactobacillus burlgarius* bacteria and is a product of the Central Proteina Prima Tbk company, Indonesia. The fermentation process is carried out by diluting Super lacto at a concentration of 15 percent based on the rules for use on the product label. After that, proceed with the feed inoculation process by spraying the inoculant evenly (4% w/v).

Table 1. Nutrient composition of feed given at the starter and finisher period in broiler chickens strain cobb

Nutrient	Starter feed (HI Pro)*	Finisher feed (MR1 – P)**
Water content (%)	13.00	13.00
Crude protein (%)	22.00 – 23.00	21.50 – 23.00
Crude fibre (%)	5.00	4.00
Fat (%)	5.00	8.00
Ash (%)	7.00	6.50
Calcium (%)	0.90	0.90 – 1.20
Phosphor (%)	0.60	0.70 – 1.00
Metabolism Energy (kcal/kg)	3.020 – 3.120	2.750 – 2.768

* Incorporated Company Charoen Pokphand, Indonesia, produces the feed.
** Incorporated Company Cheil Jedang Super Feed, Lampung produce the feed.

Experimental d~~D~~esign

This research was conducted using a Completely Randomized Design (CRD) consisting of four treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); three~~3~~ weeks (P2); four~~4~~ weeks (P3); and five weeks (P4).

Observed v~~V~~ariables

All parameters for calculating the value of observations made in this study are based on research conducted by Palupi *et al.* (2022).

Feed Consumption

The investigated parameters included consumption of ration (g/head/day), which was measured based on the difference between the ration given (g) and the rest of the ration given (g) during a specific period (days).

Body weight gain

B~~b~~ody weight gain (g/head/day), which was measured by weighing the difference between body weight at the end of the study (g) and the initial body weight (g), then divided by the length of rearing time (days).

Kommentar [P7]: Add the reference.

Kommentar [P8]: Add the reference.

Kommentar [P16]: Please add the nutrient composition of methionine, cysteine, lysine and vitamins.

Kommentar [P17]: Which days did you consider starter?

Kommentar [P18]: Which days did you consider finisher?

Kommentar [P19]: Do not use decimal

Kommentar [P9]: Add the reference.

Kommentar [P10]: Add the reference.

Kommentar [P11]: Add the reference.

Kommentar [P21]: Check the numbers

Kommentar [P20]: Change it to metabolizable energy.

Kommentar [P12]: Add city and country.

Kommentar [P13]: Please use the terms of poultry, broiler, layer instead of the bird in whole the text.

Kommentar [P22]: How many chickens divided in each group?

Kommentar [P14]: where did you purchase the chicks?

Kommentar [P15]: What were the temperature and humidity rate?

Kommentar [P23]: Not italic

Formatiert: Schriftart: Kursiv

Feed Conversion Ratio (FCR)
Ceonversion of rations, measured based on the ratio between weight gain and ration consumption.

Live weight
Then measure, the quality of the broiler carcass, including; Live weight, was measured based on the results of weighing at the end of the study (g).

Carcass percentage
Percentage of the carcass (%), which is calculated based on the percentage of weight comparison of broilers without blood, feathers, head, legs, and digestive organs (g) divided by live weight (g).

Percentage of abdominal fat
Percentage of abdominal fat (%), which is calculated based on the percentage of the comparison between the weight of abdominal fat contained in the abdominal cavity and fat attached to the digestive organs (g) with the live weight of broilers (g).

Statistical Analysis

Analysis of Variance (ANOVA) analyzes data from observation during the study. If there is a significant difference, a further test is carried out using Duncan's Multiple Range Test (Steel and~~&~~ Torrie, 1980).

RESULTS AND DISCUSSION

Production performance
The average Performance of broiler production observed during the research was ration consumption, body weight gain, and feed conversion. The data are presented in Table 2.

Table 2. Production performance at the starter and finisher period in broiler chicken strain cobb

Treatment	Feed consumption (g/head/day)	Weight gain (g/head/day)	Feed conversion ratio
P1	78.17 ± 3.45^{a}	51.83 ± 6.24^{a}	1.50 ± 0.22^{a}
P2	86.71 ± 4.12^{b}	55.55 ± 4.88^{a}	1.56 ± 1.45^{a}
P3	96.43 ± 3.41^{c}	60.28 ± 5.61^{b}	1.60 ± 1.03^{a}
P4	118.24 ± 2.66^{d}	65.80 ± 3.87^{b}	1.80 ± 1.56^{b}

^{abc} Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed for 4 weeks, P4 = fermented feed for 5 weeks

Ration consumption
The analysis of variance revealed that the duration of feeding fermented with *Lactobacillus* had a significant effect on the consumption of broiler ration ($p < 0.05$~~P<0.05~~). The average consumption of broiler rations during the study ranged from 78.17 to 118.24 (g/head/day). The most extended fermented feed would affect the ration consumption; this was assumed because adding feed fermented with *Lactobacillus* has better palatability, so broilers prefer it. Widodo *et al.* (2013) reported that fermented feed could be given to a level of 15% in the ration, b~~B~~ecause fermented feed provides aromas, flavors, and shapes that broilers prefer, thereby increasing ration consumption.

Further test results showed that the consumption ratio of P1 was significantly different from P2 ($p < 0.05$~~P<0.05~~). It was hypothesized that the increased consumption at each treatment in this study was due to the duration of the feed fermented with *Lactobacillus* supplementation, which could lead to improved feed quality. Widodo et al. (2013) found that fermented feed had improved quality compared to feed that had not undergone the fermentation process. This improvement in feed quality is because the feed contains *Lactobacillus*, which helps speed up the digestive process, thereby improving the digestibility of the feed. Getachew (2016) reported that lactic acid bacteria could live and grow in the intestine and produce enzymes, such as proteases and amylases, which could help improve digestion and produce short-chain fatty acids with antibacterial properties to protect nutritive feed. Therefore, feed intake can be improved by adding feed fermented with lactic acid bacteria.

Feed consumption in P2 was significantly different from P3, suggesting that the increased consumption was due to the palatability of the lactobacillus-fermented feed, which was preferred by livestock. Furthermore, the lactic acid produced by lactobacilli in the gut plays a tremendous role in eliminating pathogenic bacteria and maximizing the digestibility of the feed by ensuring that there is no competition for the utilization of the nutrients ingested. This statement is believed to be due to its impact on consumption (Wikanatsiri et al., 2012).

The consumption of rations at P3 was significantly different from that in P4 ($p < 0.05$~~P<0.05~~), it was suspected that feed fermented with *Lactobacillus* could improve palatability. Furthermore, throughout these 4-5 weeks of treatment, the amount of *Lactobacillus* in the intestine could be increased so that the more extended feeding fermented with *Lactobacillus* caused the more significant population of *Lactobacillus* in the digestive tract of broilers, which caused the ratio consumption and feed digestibility increased. Elbaz (2021) reported that broiler rations supplemented with *Lactobacillus* could increase palatability, feed consumption, broiler immune system (health), productivity, efficiency, and feed consumption. According to Hardiningsih *et al.* (2006), the benefits of providing *Lactobacillus* in mixed feed to broilers were increased palatability; maintaining microflora; helping increase digestive enzyme activity; reducing bacterial enzyme activity and ammonia production; increased ration consumption and digestion; neutralizing both enterotoxins and toxins; and also stimulates the immune system.

Kommentar [P27]: Take note that all diets were fermented with Lactobacillus

Kommentar [P24]: How many chicks slaughtered in each group for analysis of these parameters?

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Kursiv

Kommentar [P25]: Which software did you use for data analysis?
What was the significant level?

Kommentar [P28]: Add p value

Formatiert: Schriftart: Kursiv

Kommentar [P26]: in which group and Compare to which group?

Body weight gain

The analysis of variance showed that the feed fermented with *Lactobacillus* had a significant effect ($p \leq 0.05$ P<0.05) on the increase in the body weight of broilers. It is suspected that feed fermented with *Lactobacillus* can increase feed digestibility in the digestive tract. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect broilers' growth because *Lactobacillus* bacteria can break down simple carbohydrates into lactic acid. *Lactobacillus* bacteria can maintain the balance of other beneficial bacteria populations in the small intestine so that feed digestibility improves, affecting the increase in broilers' body weight.

The results of further tests showed that the body weight gain of broilers in treatment P1 was not significantly different ($p > 0.05$ P>0.05) with treatment P2 but significantly different ($p \leq 0.05$ P<0.05) with treatment P3 and P4. This result is thought to be due to the number of *Lactobacillus* in the digestive tract of broiler chickens because the P1 treatment is the same as the P2 treatment; this could be due to various factors. Uzer *et al.* (2013) *Lactobacilli* maintain beneficial microflora in the gastrointestinal tract, conversely, suppress the growth of pathogenic bacteria, increase digestive enzyme activity, decrease bacterial enzyme activity and ammonia production, increase food intake and digestion, and enterotoxins and neutralize immunity. A stimulating system that does not compete in digesting food.

The body weight gain of broilers in P2 was significantly different from that in P3, it was suspected that feed fermented with *Lactobacillus* was able to protect the digestive tract from pathogenic bacteria and streamline feed consumption. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect the growth of chickens. *Lactobacillus* bacteria can break down simple carbohydrates into lactic acid. *Lactobacillus*, in addition to maintaining the digestive tract and improving the nutritional value of feed. Body weight gain is closely related to feeding in terms of quantity related to feeding consumption. If feed consumption is disturbed, it will interfere with growth and vice versa; if feed consumption is sufficient, it will increase broiler body weight.

The weight ~~gain~~gains of broilers in the P1 and P2 treatments was significantly different from that in P3 and P4 treatments. It is suspected that feeding fermented feed with *Lactobacillus* can increase body weight gain due to its ability to suppress pathogenic bacteria, so it does not compete with pathogenic bacteria. Furthermore, it can also increase feed digestibility, which has a good effect on protein digestibility, where feed fermented with *Lactobacillus* produces proteolytic enzymes in the digestive tract, which then can help digest protein, thereby increasing body weight. A fermented feed with *Lactobacillus*, suppressing pathogenic bacteria, can also improve the Pof digestive organs, stimulating bile and pancreatic juice so that it affects the body weight gain of broiler chickens. Nurhayati *et al.* (2015) reported that the use of fermented feed in broiler chickens has the function of increasing the work of the digestive organs of broilers, namely stimulating the gallbladder wall to secrete bile and stimulating the secretion of pancreatic juice, which contains amylase, lipase, and protease enzymes to improve the digestion of feed ingredients such as carbohydrates, fats, and proteins. Thus, the more extended feeding of fermented feed with *Lactobacillus* resulted in better body weight gain.

Ration conversion ratio

The analysis of variance showed that the addition of fermented feed containing *Lactobacillus* had a significant effect ($p \leq 0.05$ P<0.05) on the conversion of broiler rations. It was reported that the role of fermented *Lactobacillus* in feed is quite good because the feed provided is efficient in increasing the body weight of broilers. Kiha *et al.* (2012) indicated that *Lactobacillus* in the digestive tract could suppress pathogenic bacteria, so they do not compete in digesting nutrients and maximize nutrient absorption in the digestive tract. The longer the addition of feed fermented with *Lactobacillus* can increase the body weight gain of broiler chickens; in addition, the increase in body weight of broiler chickens can be influenced by the consumption of feed and the nutritional content contained in the feed or the consumption of nutrients in the feed. The longer the feeding time fermented with *Lactobacillus*, the greater the body weight gain.

Carcass quality

The average carcass quality of broilers during the study observed was live weight, carcass percentage, and abdominal fat percentage. The data are presented in Table 3.

Table 3. Average carcass quality of broiler chickens

Treatment	Live body weight (g)	Carcass percentage (%)	Abdomen fat percentage (%)
P1	1699.50 ± 13.44[a]	72.02 ± 6.43[a]	1.24 ± 0.12[a]
P2	1797.50 ± 21.06[a]	75.02 ± 11.03[a]	1.32 ± 0.11[b]
P3	1900.75 ± 20.11[b]	77.65 ± 5.44[b]	1.40 ± 0.80[b]
P4	2002.00 ± 16.37[c]	78.39 ± 7.18[b]	1.34 ± 0.32[b]

[abc] Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed four weeks, P4 = fermented feed five weeks

Live body weight

Kommentar [P29]: tell how the feeding of fermented diet influenced body weight gain

Kommentar [P39]: add the reference.

Kommentar [P40]: With which bacteria?

Kommentar [P41]: in which group and compare to which group?

Kommentar [P42]: change the word

Kommentar [P43]: add the reference.

Kommentar [P30]: including of what?

Formatiert: Schriftart: Kursiv

Kommentar [P44]: Add the reference.

Kommentar [P45]: rephrase

Kommentar [P31]: Add p value

Kommentar [P32]: This sentence is repetitive.
Please delete it

Kommentar [P33]: Add the reference

Kommentar [P34]: Add p value

Kommentar [P35]: Refer to what?

Kommentar [P36]: change the word

Kommentar [P37]: add the reference.

Kommentar [P38]: ?

The average live weight obtained in this study ranged between 1699.50-2002.00 gr. The results of the analysis of diversity on the final weight of broiler chickens showed that the duration of feeding fermented with *Lactobacillus* had a significant effect ($p < 0.05$~~P-<0.05~~) on the live weight of broiler chickens. It is suspected that *Lactobacillus* can produce lactic acid in the digestive tract so that it can lower the pH in the digestive tract. Low pH conditions will multiply benefical bacteria, allowing for faster nutrient absorption and increased growth, affecting broiler chickens' live weight (Akhadiarto, 2010).

Further testing revealed that the live weight of broiler chickens at P1 was not significantly different ($p > 0.05$~~P>0.05~~) from P2 but was significantly different ($p < 0.05$~~P<0.05~~) from P3 and P4 regarding the live weight of broilers. This result shows that the effect of feeding time fermented with *Lactobacillus* for two weeks to three weeks gives the same live weight. This case was because *lactobacillus* activity on the duration of feeding fermented at P1 and P2 gave the same effect while feeding fermented with *Lactobacillus* for four weeks and five weeks could increase live weight higher than P1 and P2. This result is presumably because of the length of time *Lactobacillus* in the digestive tract can increase the intestinal villi's surface areas, so that nutrient absorption is better, reducing the growth of pathogenic microorganisms. In line with the research results of Ignatova *et al.* (2009), it was shown that giving a probiotic supplement (*Lactobacillus*) for five weeks positively increases the live weight of broilers and livestock products that are safe for consumption.

Feeding fermented with *Lactobacillus* at P2 was significantly different ($p < 0.05$~~P<0.05~~) compared to P3 and P4 on the results of the weight of broiler chickens. It is suspected that the duration of feeding fermented with *Lactobacillus* for three weeks is still in average conditions to produce a live weight. Moreover, because the feed fermented with *Lactobacillus* is given only up to 3 weeks, after more than three weeks, the lactic acid bacteria produced from the *lactobacillus* fermented feed will be less so that the acidic conditions in the digestive tract are normal. According to Rodriguez *et al.* (2010), adding Lactobacillus to the feed will reduce pH and increase the number of microorganisms in the digestive tract, accelerating the growth of digestive organs and allowing them to develop optimally. Feeding fermented with *Lactobacillus* at four weeks and five weeks resulted in high body weight gain. It can be assumed that the more extended feeding fermented with *Lactobacillus* will result in greater body weight.

Feeding fermented feed with *Lactobacillus* for four weeks was significantly different ($p < 0.05$~~P<0.05~~) compared to feeding fermented feed for five weeks. Presumably, the longer the feeding is fermented with Lactobacillus, the more lactic acid bacteria are produced, which lower the digestive tract's pH, facilitating the metabolic process and producing a high body weight. This case follows the opinion of Elbaz *et al.* (2021), which indicated that the use of *Lactobacillus* in feed aims to balance the microflora in the digestive tract to increase the absorption of nutrients to produce ideal body weight.

Carcass percentage

The average percentage of broiler carcass for each treatment during the study can be seen in Table 3. The average percentage of broiler carcasses obtained in this study ranged from 72.02 to 78.39%. The results of the analysis of variance on broiler carcasses showed that the addition of feed fermented with *Lactobacillus* had a significant effect ($p < 0.05$~~P<0.05~~) on the percentage carcasses of broilers. This result was because the duration of feeding fermented with *Lactobacillus* can lower the pH of the digestive tract and facilitate the work of the pepsin enzyme so that protein absorption increases. Baeza *et al.* (2022) stated that the average percentage of broiler carcasses is around 65-78% of the final body weight.

The results of further tests on the percentage carcasses of broiler carcasses showed that the percentage of carcasses in P1 was not significantly different ($p > 0.05$~~P>0.05~~) with P2 but significantly different ($p < 0.05$~~P<0.05~~) with P3 and P4. This result indicated that the effect of feeding fermented feed with *Lactobacillus* for two weeks and three weeks resulted in a carcass percentage of 72.02%-75.02% lower than P3 and P4. This case was because feeding fermented with *Lactobacillus* for two weeks and three weeks has the potential for the growth of pathogenic bacteria such as *salmonella* bacteria because the fermented feed has a function to minimize the growth of *salmonella* pathogenic bacteria so that the protein digestion process assisted by enzymes will be slower compared to P3 and P4, while the duration of feeding fermented with *Lactobacillus* for four weeks to 5 weeks resulted in a higher carcass percentage than P1 and P2, ranging from 77.64% to 78.39%. On This case was because *Lactobacillus* acts as a growth promoter which can increase the work of the pepsin enzyme in the digestive tract so that the absorption of nutrients in the intestines and the resulting metabolic products can be utilized by the livestock body to form and add new tissues such as meat formation (Ignatova et al., 2009).

Feeding fermented with *Lactobacillus* in treatment P2 was significantly different ($p < 0.05$~~P<0.05~~) with P3 and P4 on the percentage of carcasses. This case is because the length of time of fermented feed with *Lactobacillus* will produce a great percentage of the carcass. After all, *Lactobacillus* will produce lactic acid bacteria, which facilitate the work of the digestive tract, resulting in a high percentage of the carcass. Maunatin and Khanifa (2012) stated that lactic acid bacteria found in the digestive system could neutralize toxins produced by pathogenic bacteria, affecting enzyme activity in the small intestine so that the blood will circulate nutrients throughout the body to form meat.

Feeding fermented feed with *Lactobacillus* at P3 was not significantly different ($p > 0.05$~~P>0.05~~) with P4. This case

Kommentar [P46]: in which group and compare to which group?

Kommentar [P47]: Which further testing?

Kommentar [P48]: In which group and compared to which group?

was because the four-week fermented feed had the same number of *lactobacillus* bacteria as the fermented feed treatment for five weeks, so the enzyme performance produced was the same in the P3 and P4 treatments. One of the increased enzyme performances due to the increase in the microbial population is the pepsin enzyme to break down protein. Then feed nutrients will be absorbed throughout the body to form meat deposition. In line with the research of Mountzouris *et al.* (2010) reported that the use of probiotics in feed can work optimally in the digestive tract by increasing the number of microbial populations, thereby balancing the microflora in the digestive tract, protecting the digestive system, improving intestinal health and increasing livestock productivity.

Abdominal fat percentage

The average percentage of abdominal fat weight ranged from 1.24 to 1.40%. It can be assumed that feeding fermented with *Lactobacillus* facilitates the hydrolysis of carbohydrates in the digestive tract, facilitating the absorption of glucose and monosaccharides. Meanwhile, feed containing easily digestible carbohydrates will result in increased abdominal fat. Following the view of Jha and Mishra (2021), poultry-fed carbohydrate-based diets have a higher abdominal fat content than fibrous; easily digestible carbohydrates tend to be converted into energy reserves in the form of fat. Hidayat (2015) reported that fat formation occurs due to excess energy consumed. Excess energy in broilers will be stored in the form of abdominal fat.

Further test results revealed that the percentage of abdominal fat given fermented feed with *Lactobacillus* at P1 was significantly different ($p < 0.05$~~P<0.05~~) from P2, P3, and P4 in terms of abdominal fat percentage. It is suspected that the feeding duration fermented with *Lactobacillus* at P1 was still in normal condition resulting in a lower percentage of abdominal fat. In contrast, at P2, P3, and P4, the length of feeding fermented with *Lactobacillus* could reduce the activity of the lipase enzyme that plays a role in the rate of acid synthesis. Fat. Fouad and El-Senousey (2014) reported that the decrease in abdominal fat deposition with a decrease in the energy content of the ration was caused by the reduced activity of lipase enzymes associated with lipogenic processes in the liver. Lipogenesis is a fat deposition process that includes fatty acid synthesis and triglyceride synthesis that occurs in the liver in the mitochondria, cytoplasm, and adipose tissue. Fat in the body originates from feed and is produced from the synthesis process in the liver (Jensen-Urstad & Semenkovich, 2012). Feeding fermented feed with *Lactobacillus* at P2 and P3 was not significantly different ($p > 0.05$~~P>0.05~~) but significantly different from P4. In this case, presumably because feeding fermented with *Lactobacillus* can optimize the absorption of the digestive tract so that the nutritional content of the feed is more directed at the formation of meat and bones than fat in each treatment. Fouad and El-Senousey (2014) stated that nutrition affects the deposition of abdominal fat in the body of broiler chickens. Reduction of body fat deposits in broilers, including abdominal fat, occurs due to a reduction in fatty acid synthesis in the liver and a decrease in lipase enzyme secretion, thereby reducing fat absorption. Zhang *et al.* (1999) stated that fatty acids reduce the amount of body fat deposition in broilers by suppressing the activity of the lipase enzyme in plasma.

CONCLUSION

According to the present study's findings, adding fermented *Lactobacillus* feed for five weeks could increase body weight gain by 16.30%, decrease feed conversion by 11.10% and improve the carcass quality of broiler chickens.

Kommentar [P50]: Add recommendation for future studies.

Acknowledgments

The authors ~~We~~ would like to thank the Incorporated Company Satwa Utama Integrasi as a funding source; and Apriadi, Epanria, and Rafi Megansyah for their assistance during the research.

Authors' contribution

All authors developed the theory and supervised the research. Rizki Palupi contributed to the sample collection and analysis calculations. All authors read and approved the final version of the manuscript for publishing in the present journal.

Competing interests

The authors have declared that no competing interest exists

Ethical consideration

All authors have reviewed the manuscripts for ethical concerns, such as plagiarism, consent to publish, misconduct, data fabrication and falsification, double publishing and submission, and redundancy.

REFERENCES

Kommentar [P51]: Revise the name of journal for all references based on the journal format, please.
It shouldn't be in Italic form and full name of the journal is needed.

Kommentar [P49]: ?

Akhadiarto, S. (2010). Pengaruh Pemberian Probiotik Temban, Biovet Dan Biolacta Terhadap Persentase Karkas, Bobot Lemak Abdomen Dan Organ Dalam Ayam Broiler. *Jurnal Sains Dan Teknologi Indonesia*, *12*(1), 53–59. https://doi.org/10.29122/jsti.v12i1.851

Astuti, F K, Busono, W., & Sjofjan, O. (2015). The effect of liquid probiotics in broiler feed for broiler production performance. *EnviIndonesian Journal of Evironment and Sustainable Development*, *6*(2), 99–104. http://repository.ub.ac.id/159019/

Astuti, Farida Kusuma, Busono, W., & Sjofjan, O. (2015). Pengaruh Penambahan Probiotik Cair dalam Pakan Terhadap Penampilan Produksi Pada Ayam Pedaging. *Pembangunan Dan Alam Lestari*, *6*(2), 99–104. https://jpal.ub.ac.id/index.php/jpal/article/view/192/195

Baéza, E., Guillier, L., & Petracci, M. (2022). Review:

Production factors affecting poultry carcass and meat quality attributes. *Animal*, *16*(xxxx). https://doi.org/10.1016/j.animal.2021.100331

Elbaz, A. M. (2021). Effects of Diet Containing Fermented Canola Meal on Performance, Blood Parameters, and Gut Health of Broiler Chickens. *Journal of World's Poultry Research*, *11*(1), 01–07. https://doi.org/10.36380/jwpr.2021.1

Fatmaningsih, R., & Nova, K. (2016). Broiler Performance in Conventional Brooding System and Thermos. *Jurnal Ilmiah Peternakan Terpadu*, *4*(3), 222–229.

Fouad, A. M., & El-Senousey, H. K. (2014). Nutritional factors affecting abdominal fat deposition in poultry: A review. *Asian-Australasian Journal of Animal Sciences*, *27*(7), 1057–1068. https://doi.org/10.5713/ajas.2013.13702

Getachew, T. (2016). A Review on Effects of Probiotic Supplementation in Poultry Performance and Cholesterol Levels of Egg and Meat. *Journal of World's Poultry Research*, *6*(61), 31–36. http://jwpr.science-line.com/

Hardiningsih, R., Napitupulu, R. N. R., & Yulinery, T. (2006). Journal Of Biology Diversity. In *Biodiversitas* (Vol. 7, Issue 1, pp. 15–17).

Hidayat, C. (2015). Reducing Abdominal Fat Deposition in Broiler Through Feeding Management. *Indonesian Bulletin of Animal and Veterinary Sciences*, *25*(3), 125–134. https://doi.org/10.14334/wartazoa.v25i3.1157

Ignatova, M., Sredkova, V., & Marasheva, V. (2009). Effect of Dietary Inclusion of Probiotic on Chickens Performance and Some Blood Indices. *Biotechnology in Animal Husbandry*, *25*(6), 1079–1085. http://scindeks.ceon.rs/article.aspx?artid=1450-915609060791

Jensen-Urstad, A. P. L., & Semenkovich, C. F. (2012). Fatty acid synthase and liver triglyceride metabolism: Housekeeper or messenger? *Biochimica et Biophysica Acta - Molecular and Cell Biology of Lipids*, *1821*(5), 747–753. https://doi.org/10.1016/j.bbalip.2011.09.017

Jha, R., & Mishra, P. (2021). Dietary fiber in poultry nutrition and their effects on nutrient utilization, performance, gut health, and on the environment: a review. *Journal of Animal Science and Biotechnology*, *12*(1), 1–16. https://doi.org/10.1186/s40104-021-00576-0

Khempaka, S., Thongkratok, R., Okrathok, S., & Molee, W. (2014). An evaluation of cassava pulp feedstuff fermented with a. oryzae, on growth performance, nutrient digestibility and carcass quality of broilers. *Journal of Poultry Science*, *51*(1), 71–79. https://doi.org/10.2141/jpsa.0130022

Kiha, A. F., Murningsih, W., & Tristiarti. (2012). Pengaruh Pemeraman Ransum dengan Sari Daun Pepaya terhadap Kecernaan Lemak dan Energi Metabolis Ayam Broiler. *Animal Agricultural Journal*, *1*(1), 265–276.

Maunatin, A., & Khanifa, K. (2012). UJI POTENSI PROBIOTIK Lactobacillus plantarium SECARA IN-VITRO. *ALCHEMY*, *2*(1), 26–34. https://doi.org/10.18860/al.v0i0.2298

McNaught, C. E., & MacFie, J. (2001). Probiotics in clinical practice: A critical review of the evidence. *Nutrition Research*, *21*(1–2), 343–353. https://doi.org/10.1016/S0271-5317(00)00286-4

Mountzouris, K. C., Tsitrsikos, P., Palamidi, I., Arvaniti, A., Mohnl, M., Schatzmayr, G., & Fegeros, K. (2010). Effects of probiotic inclusion levels in broiler nutrition on growth performance, nutrient digestibility, plasma immunoglobulins, and cecal microflora composition. *Poultry Science*, *89*(1), 58–67. https://doi.org/10.3382/ps.2009-00308

Naji, S. A. H., Al-Gharawi, J. K. M., & Al-Zamili, I. F. B. (2015). The effect of starting age of feeding wetting fermented feed on the intestinal flora, humoral and cellular immunity of broiler chicks. *International Journal of Advanced Research*, *3*(1), 41–49.

Nurhayati, Wirawati, C. U., & Putri, D. D. (2015). Penggunaan Produk Fermentasi Dan Kunyit Dalam Pakan Terhadap Performan Ayam Pedaging Dan Income Over Feed and Chick Cost. *Zootec*, *35*(2), 379. https://doi.org/10.35792/zot.35.2.2015.9457

Palupi, R., Lubis, F. N. L., & Pratama, A. N. T. (2022). The effect of the use of cassava tuber (Manihot esculenta) and Indigofera zollingeriana leaf flour combination as a source of energy supplemented with citric acid in ration on broiler small intestine characteristics and productivity. *Journal of Advanced Veterinary and Animal Research*, *9*(3), 471–480. https://doi.org/10.5455/javar.2022.i616

Pradikta, R. W., Sjofjan, O., & Djunaidi, I. H. (2018). Evaluasi penambahan probiotik (Lactobacillus sp) cair dan padat dalam pakan terhadap penampilan produksi ayam petelur. *Jurnal Ilmu-Ilmu Peternakan*, *28*(3), 203. https://doi.org/10.21776/ub.jiip.2018.028.03.03

Rodríguez-Lecompte, J. C., Brady, J., Camelo-Jaimes, G., Sharif, S., Crow, G., Ramirez-Yanez, G., Guenter, W., & House, J. D. (2010). Intestinal characterization of avian defensins and cytokines after the early administration of probiotic with organic acids in broilers. *Avian Immunology Research Group. Budapest, Hungary*.

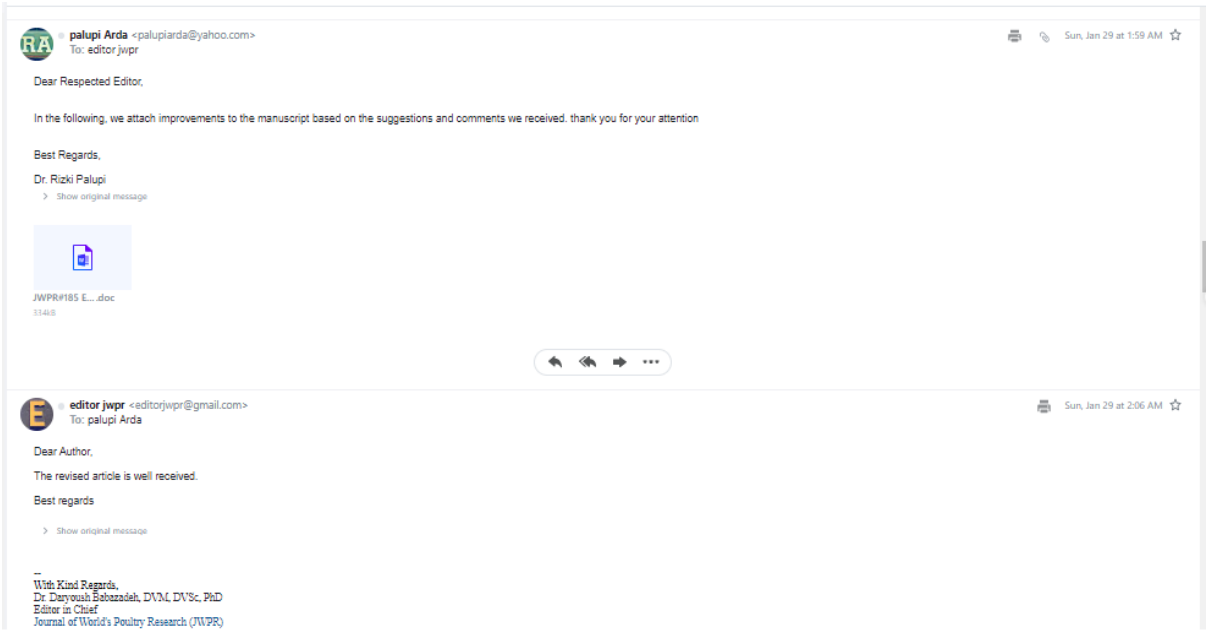
Steel, R. G. D., & Torrie, J. H. (1980). *Principles and procedures of statistics*. McGraw-Hill.

Sugiharto, S. (2019). A review on fungal fermented cassava pulp as a cheap alternative feedstuff in poultry ration. *Journal of World's Poultry Research*, *9*(1), 1–6. https://doi.org/10.36380/jwpr.2019.0

Uzer, F., Iriyanti, N., & Roesdiyanto, R. (2013). The Use of Functional Feed In Rations on Consumtion and Body Weight Gain Broiler. *Jurnal Ilmiah*

Peternakan, *1*(1), 282–288.
Widodo, A. R., Setiawan, H., & dan Indreswari, S. R. (2013). Kecernaan Nutrien dan Performan Puyuh (Coturnix coturnix japonica) Jantan yang Diberi Ampas Tahu Fermentasi dalam Ransum. *Tropical Animal Husbandry*, *2*(1), 51–57.
Wikanatsiri, Utama, C. S., & Suyanto, A. (2012). Aplikasi Proses Fermentasi Kulit Singkong Menggunakan Stater Asal Limbah Kubis dan Sawi pada Pembuatan Pakan Ternak Berpotensi Probiotik. *Seminar Hasil Penelitian LPPM Universitas Muhammadiyah Semarang*, 281–288.
Zhang, X., Roland, D. A., Mcdaniel, G. R., & Rao, S. K. (1999). Effect of natuphos® phytase supplementation to feed on performance and ileal digestibility of protein and amino acids of broilers. *Poultry Science*, *78*(11), 1567–1572. https://doi.org/10.1093/ps/78.11.1567
Zulfan, & Zulfikar. (2020). Performances of Broilers Fed the Commercial Diet Partly Substituted by Fermented Feed Based onthe Mixing of Corn, Rice Bran, and Leubim Fish (Canthidermis maculata) Processing By-Product Meal. *Jurnal Ilmiah Ilmu-Ilmu Peternakan*, *23*(12), 92–103.

6. Bukti Konfirmasi Submit hasil revisi ke-dua (29 Januari 2023)



palupi Arda <palupiarda@yahoo.com>
To: editor jwpr

Sun, Jan 29 at 1:59 AM

Dear Respected Editor,

In the following, we attach improvements to the manuscript based on the suggestions and comments we received. thank you for your attention

Best Regards,

Dr. Rizki Palupi

Show original message

JWPR#185 E... .doc
334kB

editor jwpr <editorjwpr@gmail.com>
To: palupi Arda

Sun, Jan 29 at 2:06 AM

Dear Author,

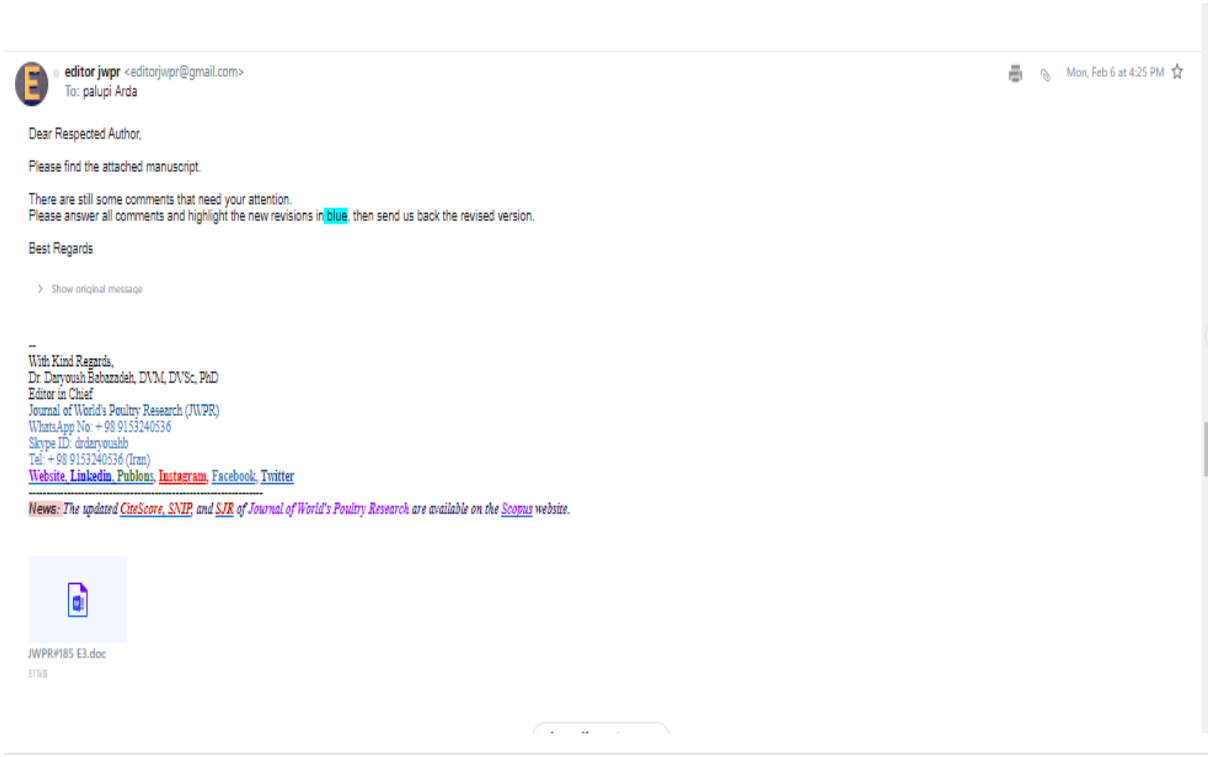
The revised article is well received.

Best regards

Show original message

--
With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)

7. Bukti konfirmasi Hasil review ke-tiga (6 Februari 2023)



editor jwpr <editorjwpr@gmail.com>
To: palupi Arda

Mon, Feb 6 at 4:25 PM

Dear Respected Author,

Please find the attached manuscript.

There are still some comments that need your attention.
Please answer all comments and highlight the new revisions in blue, then send us back the revised version.

Best Regards

› Show original message

--
With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

News: *The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.*

JWPR#185 E3.doc
311kB

JWPR
Journal of World's Poultry Research

2022, Scienceline Publication
J. World Poult. Res. 12(1): 00-00, Mar 25, 2022
Research Paper, PII: S2322455X2200000-12

Original Research

Effect of Duration of Feeding Fermented Feed by *Lactobacillus* on Production Performance and Carcass Quality of Broiler Chickens

Rizki Palupi*, Fitri Nova Liya Lubis, Anggriawan Naidilah Tetra Pratama, and Muhakka

Department of Technology and Livestock Industry, Faculty of Agricultural, Sriwijaya University, Indralaya, South Sumatera, Indonesia

*Corresponding author's Email: palupiarda@yahoo.com

Received: xx Mo. 2022
Accepted: xx Mo. 2022

Kommentar [P1]: Please paraphrase the title of is repeated 3 times and feeding fermented feed should be paraphrased.

ABSTRACT

The quality of broiler chicken carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production. The study aimed to determine the effect of feeding fermented feed at different times on the production performance and quality of broiler chicken carcasses. The number of Day Old Chick (DOC) used in this study was 180 broiler chickens strain Cobb. This study was carried out experimentally using a Complete Randomized Design consisting of 4 treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); 3 weeks (P2); 4 weeks (P3); and five weeks (P4). Experimental parameters include ration consumption, weight gain, and ration conversion. In addition, the quality of carcasses is also observed: live weight, carcass percentage, and percentage of broiler chicken abdominal fat. The results showed that the longer the time of fermentation feed significantly increased ration consumption by 40.07% and increased 13.77% weight gain, as well as decreased ration conversion by 25.33%. Furthermore, the same results were also shown in the observation of live weight by 17.80% and increased the percentage of the carcass by 8.84% while the percentage of abdominal fat decreased by 12.90%. Based on these results, it was concluded that the provision of fermented feed for 5 weeks can improve the production performance and carcass quality of broiler chickens.

Keywords: Broiler chicken, Carcass quality, Fermented feed, Performance

INTRODUCTION

Broiler chickens have a role as a source of animal protein that is in demand by consumers. This demand is because broiler chicken carcasses can be produced faster than other livestock. However, the quality of broiler carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production (Baéza et al., 2022). Various attempts have been made to increase the amount of digested nutrients and increase digestibility by processing feed before consumption. Feed processing that can be pursued is fermenting the feed. One of the feed processing that can be done is by fermenting the feed. The fermentation process can increase feed digestibility and crude protein content and reduce crude fiber in feed (Khempaka et al., 2014). The fermented feed provides several benefits, including improving nutritional properties (reducing fiber and increasing protein content) and intestinal health. It will accelerate broiler chicken's growth (Sugiharto, 2019).

The fermentation process requires an inoculant to speed up the breakdown of nutrients in the feed (Romero et al., 2017). One of the inoculants that can be used is by adding *Lactobacillus*. *Lactobacillus* are lactic acid bacteria that are often used in the fermentation process (Nair et al., 2019; Romero et al., 2017; Singracha et al., 2017). Lactic acid bacteria will grow and develop on the substrate during fermentation, so the feed contains probiotics utilized by livestock to help the food digestion process. Astuti et al. (2015) reported that probiotics could be given at a concentration of 0.6 v/w in broiler up to 28 days of age. The higher the level of the probiotic *Lactobacillus* species in feed, the better the effect on the growth

To cite this paper: 1th Author surname A, 2th Author surname B , 3th Author surname C. 2023. Article title should be regular and 7 pt. *J. World Poult. Res.*, Add No. of Volume (Add No. of Issue): 00-00. https://dx.doi.org/10.36380/jwpr.2022.x

(Pradikta et al., 2018). Previously, Mcnaught and MacFie (2001) stated that many probiotics could attach firmly to intestinal cells, including several types of lactic acid bacteria, such as *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus plantarum,* and a large number of *Bifidobacteria*. The ability to stick to the digestive tract will cause probiotic microbes to develop appropriately, and pathogenic microbes such as *Escherichia coli* and *Salmonella Typhimurium* in the digestive tract will be reduced from the animal host cells (McNaught & MacFie, 2001).

The feeding duration of specific feeds will allow probiotics to stick to poultry's digestive tract for a more extended period, affecting livestock production (Al-Khalaifa et al., 2019; Al-Khalaifah, 2018). The results of the research by Zulfan *et al.* (2020) and Naji *et al.* (2015) reported that fermented feed ingredients could be given in commercial rations without disturbing the growth and increasing the income over feed costs of broiler. Furthermore, feeding in the early phase of growth or during the brooding period can affect the growth of broiler DOC (Al-Khalaifa et al., 2019). When chicks are 1 to 14 days old, cell multiplication or hyperplasia will occur. The multiplication of these cells includes the development of the digestive tract, respiratory tract, and immune system. Body cells will increase in number by way of cell division. The hyperplasia process will affect further growth in the form of hypertropia growth, cells will increase in size or cell maturation (Fatmaningsih and Nova, 2016). Based on the description above, a study was aimed to determine the effect of fermented feed at different times on the production performance and carcass quality of broiler chickens.

MATERIALS AND METHODS

Ethical approval

An animal feeding experiment was conducted at the experimental station, Department of Animal Science, Faculty of Agriculture, Universitas Sriwijaya, South Sumatera, Indonesia. The animals were cared for according to the Indonesian Institute of Sciences Animal Welfare Guidelines. The approval of the experiment was granted from Universitas Sriwijaya with approval number KPPHP-2021-1.

Method and sampling preparation

This study used 180 one-day-old chicks (DOC) of Cobb strain broilers obtained from Charoen Pokphand, Indonesia with an average weight of 38 g and placed in 20 postal cages with a size of 100 cm x 100 cm. Nine broilers were placed in each cage. The cages had food dishes, water containers, and 60-watt incandescent lamps for lighting and warmth while the chicks were in them. The feed used during the starter period was HI Pro (Charoen Pokphand, Indonesia), the feed is given to DOC up to the age of 14 days, and at the time, the finisher was MR1-P (Cheiljedang, Indonesia), the finisher feed given at the age of 3 weeks to 5 weeks of age. The composition of the nutrients in the feed used during the study is shown in Table 1.

Before the feed is given to the experimental animals, the feed is fermented for 7 days using Super lacto which contains the *Lactobacillus burlgarius* bacteria and is a product of the Central Proteina Prima Tbk company, Indonesia. The fermentation process is carried out by diluting Super lacto at a concentration of 15 percent based on the rules for use on the product label. After that, proceed with the feed inoculation process by spraying the inoculant evenly (4% w/v).

As for the measurement of carcass quality in research carried out at the final stage of the study. Samples were taken randomly as many as 2 in each treatment and replicated. Then the chicken samples were fasted for 8 hours before being slaughtered.

Table 1. Nutrient composition of feed given at the starter and finisher period in broiler chickens strain cobb

Nutrient	Starter feed (HI Pro)*	Finisher feed (MR1 – P)**
Water content (%)	13	13
Crude protein (%)	22.00-23.00	21.50-23.00
Crude fibre (%)	5.00	4.00
Fat (%)	5.00	8.00
Ash (%)	7.00	6.50
Calcium (%)	0.90	0.90-1.20
Phosphor (%)	0.60	0.70-1.00
Metabolizable energy (kcal/kg)	3,020-3,120	2,750-2,768
Methionine	0.61	0.56
Methionin+Cyistein	0.78	0.75
Lysine	1.28	1.28
Vitamin C (IU)	300	300
Selenium (ppm)	0.1	0.5

* Incorporated Company Charoen Pokphand, Indonesia, produces the feed.
** Incorporated Company Cheil Jedang Super Feed, Lampung produce the feed.

Kommentar [P4]: Which days did you consider starter?

Kommentar [P5R4]: Pay attention to the comment

Kommentar [P6]: Which days did you consider finisher?

Kommentar [P7R6]: Pay attention to the comment

Kommentar [P2]: What were the temperature and humidity rate?

Kommentar [P3R2]: Pay attention to the comment

Experimental design

This research was conducted using a Completely Randomized Design (CRD) consisting of four treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); three weeks (P2); four weeks (P3); and five weeks (P4).

Observed variables

All parameters for calculating the value of observations made in this study are based on research conducted by Palupi et al. (2022).

Feed Consumption

The investigated parameters included consumption of ration (g/head/day), which was measured based on the difference between the ration given (g) and the rest of the ration given (g) during a specific period (days).

Body weight gain

Body weight gain (g/head/day), was measured by weighing the difference between body weight at the end of the study (g) and the initial body weight (g), then divided by the length of rearing time (days).

Feed Conversion Ratio (FCR)

Conversion of rations measured based on the ratio between weight gain and ration consumption.

Live weight

Then measure, the quality of the broiler carcass, including; Live weight, was measured based on the results of weighing at the end of the study (g).

Carcass percentage

Percentage of the carcass (%), which is calculated based on the percentage of weight comparison of broilers without blood, feathers, head, legs, and digestive organs (g) divided by live weight (g).

Percentage of abdominal fat

Percentage of abdominal fat (%), which is calculated based on the percentage of the comparison between the weight of abdominal fat contained in the abdominal cavity and fat attached to the digestive organs (g) with the live weight of broilers (g).

Statistical analysis

The data will be processed using SPSS software (version 20), based on the design used. Analysis of Variance (ANOVA) analyzes data from observation during the study. If there is a significant difference, a further test is carried out using Duncan's Multiple Range Test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Production performance

The average Performance of broiler production observed during the research was ration consumption, body weight gain, and feed conversion. The data are presented in Table 2.

Table 2. Production performance at the starter and finisher period in broiler chicken strain cobb

Treatment	Feed consumption (g/head/day)	Weight gain (g/head/day)	Feed conversion ratio
P1	78.17 ± 3.45^{a}	51.83 ± 6.24^{a}	1.50 ± 0.22^{a}
P2	86.71 ± 4.12^{b}	55.55 ± 4.88^{a}	1.56 ± 1.45^{a}
P3	96.43 ± 3.41^{c}	60.28 ± 5.61^{b}	1.60 ± 1.03^{a}
P4	118.24 ± 2.66^{d}	65.80 ± 3.87^{b}	1.80 ± 1.56^{b}

^{abc} Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed for 4 weeks, P4 = fermented feed for 5 weeks

Ration consumption

The analysis of variance revealed that the duration of feeding fermented with *Lactobacillus* had a significant effect on the consumption of broiler chicken ration ($p < 0.05$). The average consumption of broiler rations during the study ranged from 78.17 to 118.24 (g/head/day). The most extended fermented feed would affect the ration consumption; this was assumed because adding feed fermented with *Lactobacillus* has better palatability, so broilers prefer it. Widodo *et al.* (2013) reported that fermented feed could be given to a level of 15% in the ration, because fermented feed with *Lactobacillus* provides aromas, flavors, and shapes that broilers prefer, thereby increasing ration consumption.

Further test results showed that the consumption ratio of P1 was significantly different from P2 ($p < 0.05$). It was hypothesized that the increased consumption at each treatment in this study was due to the duration of the feed fermented with *Lactobacillus* supplementation, which could lead to improved feed quality. Widodo et al. (2013) found that fermented feed had improved quality compared to feed that had not undergone the fermentation process. This improvement in feed quality is because the feed contains *Lactobacillus*, which helps speed up the digestive process, thereby improving the digestibility of the feed. Getachew (2016) reported that lactic acid bacteria could live and grow in the intestine and produce enzymes, such as proteases and amylases, which could help improve digestion and produce short-chain fatty acids with antibacterial properties to protect nutritive feed. Therefore, feed intake can be improved by adding feed fermented with lactic acid bacteria.

Feed consumption in P2 was significantly different from P3, suggesting that the increased consumption was due to the palatability of the lactobacillus-fermented feed, which was preferred by livestock ($p < 0.05$). Furthermore, the lactic acid produced by lactobacilli in the gut plays a

Kommentar [P12]: Not italic
Please revise it in whole the text.

Kommentar [P8]: How many chicks slaughtered in each group for analysis of these parameters?

Kommentar [AN9R8]: We think it was clear. because each broiler chicken was slaughtered

Kommentar [P10R8]: Do you mean all chickens were slaughtered?
Generally, a specific number of each group should be slaughtered.

Kommentar [P11]: What was the significant level?

tremendous role in eliminating pathogenic bacteria and maximizing the digestibility of the feed by ensuring that there is no competition for the utilization of the nutrients ingested. This statement is believed to be due to its impact on consumption (Wikanatsiri et al., 2012).

The consumption of rations at P3 was significantly different from that in P4 ($p < 0.05$), it was suspected that feed fermented with *Lactobacillus* could improve palatability. Furthermore, throughout these 4-5 weeks of treatment, the amount of *Lactobacillus* in the intestine could be increased so that the more extended feeding fermented with *Lactobacillus* caused the more significant population of *Lactobacillus* in the digestive tract of broilers, which caused the ratio consumption and feed digestibility increased. Elbaz (2021) reported that broiler rations supplemented with *Lactobacillus* could increase palatability, feed consumption, broiler immune system (health), productivity, efficiency, and feed consumption. According to Hardiningsih *et al.* (2006), the benefits of providing *Lactobacillus* in mixed feed to broilers were increased palatability; maintaining microflora; helping increase digestive enzyme activity; reducing bacterial enzyme activity and ammonia production; increased ration consumption and digestion; neutralizing both enterotoxins and toxins; and also stimulates the immune system.

Body weight gain

The analysis of variance showed that the feed fermented with *Lactobacillus* had a significant effect ($p < 0.05$) on the increase in the body weight of broilers. It is suspected that feed fermented with *Lactobacillus* can increase feed digestibility in the digestive tract. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect broilers' growth because *Lactobacillus* bacteria can break down simple carbohydrates into lactic acid. *Lactobacillus* bacteria can maintain the balance of other beneficial bacteria populations in the small intestine so that feed digestibility improves, affecting the increase in broilers' body weight.

The results of further tests showed that the body weight gain of broilers in treatment P1 was not significantly different ($p > 0.05$) with treatment P2 but significantly different ($p < 0.05$) with treatment P3 and P4. This result is thought to be due to the number of *Lactobacillus* in the digestive tract of broiler chickens because the P1 treatment is the same as the P2 treatment; this could be due to various factors. Uzer *et al.* (2013) *Lactobacilli* maintain beneficial microflora in the gastrointestinal tract, conversely, suppress the growth of pathogenic bacteria, increase digestive enzyme activity, decrease bacterial enzyme activity and ammonia production, increase food intake and digestion, and enterotoxins and neutralize immunity. A stimulating system that does not compete in digesting food.

The body weight gain of broilers in P2 was significantly different from that in P3 ($p < 0.05$); it was suspected that feed fermented with *Lactobacillus* was able to protect the digestive tract from pathogenic bacteria and streamline feed consumption. Astuti *et al.* (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect the growth of chickens which could break down simple carbohydrates into lactic acid. *Lactobacillus*, in addition to maintaining the digestive tract and improving the nutritional value of feed. Body weight gain is closely related to feeding in terms of quantity related to feeding consumption. If feed consumption is disturbed, it will interfere with growth and vice versa; if feed consumption is sufficient, it will increase broiler body weight.

The weight gains of broilers in the P1 and P2 treatments were significantly different from that in P3 and P4 treatments ($p < 0.05$). It is suspected that feeding fermented feed with *Lactobacillus* can increase body weight gain due to its ability to suppress pathogenic bacteria. Furthermore, it can also increase feed digestibility, which has the effect of increasing the digestibility of protein, where feed fermented with *Lactobacillus* produces proteolytic enzymes in the digestive tract, which then can help digest protein, thereby increasing body weight (Muck et al., 2018). A fermented feed with *Lactobacillus,* suppressing pathogenic bacteria, can also improve the digestive organs, stimulating bile and pancreatic juice so that it affects the body weight gain of broiler chickens (Uguru et al., 2022). Nurhayati *et al.* (2015) reported that the use of fermented feed in broiler chickens has the function of increasing the work of the digestive organs of broilers, namely stimulating the gallbladder wall to secrete bile and stimulating the secretion of pancreatic juice, which contains amylase, lipase, and protease enzymes to improve the digestion of feed ingredients such as carbohydrates, fats, and proteins. Thus, the more extended feeding of fermented feed with *Lactobacillus* resulted in better body weight gain.

Ration conversion ratio

The analysis of variance showed that the addition of fermented feed containing *Lactobacillus* with 5 weeks curing time (P4) had a significant effect ($p < 0.05$) on the conversion of broiler rations. It was reported that the role of fermented *Lactobacillus* in feed is essential because the feed provided is efficient in increasing the body weight of broilers. Kiha *et al.* (2012) indicated that *Lactobacillus* in the digestive tract could suppress pathogenic bacteria, so they do not compete in digesting nutrients and maximize nutrient absorption in the digestive tract. The longer ~~the~~ addition of feed fermented with *Lactobacillus* can increase the body weight gain of broiler chickens; in addition, the increase in body weight of broiler chickens can be influenced by the consumption of feed and the nutritional content contained in the feed or the consumption of nutrients in the feed. The longer the feeding time fermented with *Lactobacillus*, the greater the body weight gain.

Kommentar [P13]: Add the reference

Kommentar [P14R13]: Please add the reference.

Kommentar [P15]: With which bacteria?

Kommentar [P16R15]: Pay attention to the comment

Kommentar [P17]: add the reference.

Kommentar [P18R17]: Pay attention to the comment

Kommentar [P19]: Rephrase it

Carcass quality

The average carcass quality of broilers during the study observed was live weight, carcass percentage, and abdominal fat percentage. The data are presented in Table 3.

Table 3. Average carcass quality of broiler chickens

Treatment	Live body weight (g)	Carcass percentage (%)	Abdomen fat percentage (%)
P1	1699.50 ± 13.44[a]	72.02 ± 6.43[a]	1.24 ± 0.12[a]
P2	1797.50 ± 21.06[a]	75.02 ± 11.03[a]	1.32 ± 0.11[b]
P3	1900.75 ± 20.11[b]	77.65 ± 5.44[b]	1.40 ± 0.80[b]
P4	2002.00 ± 16.37[c]	78.39 ± 7.18[b]	1.34 ± 0.32[b]

[abc] Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed four weeks, P4 = fermented feed five weeks

Live body weight

The average live weight obtained in this study ranged between 1699.50-2002.00 gr. The results of the analysis of diversity on the final weight of broiler chickens showed the addition of fermented feed containing *Lactobacillus* with 5 weeks curing time (P4) had a significant effect ($p < 0.05$) on the live weight of broiler chickens. It is suspected that *Lactobacillus* can produce lactic acid in the digestive tract so that it can lower the pH in the digestive tract. Low pH conditions will multiply beneficial bacteria, allowing for faster nutrient absorption and increased growth, affecting broiler chickens' live weight (Akhadiarto, 2010). On the other hand, based on this results revealed that the live weight of broiler chickens at P1 was not significantly different ($p > 0.05$) from P2 but was significantly different ($p < 0.05$) from P3 and P4 regarding the live weight of broilers. This result shows that the effect of feeding time fermented with *Lactobacillus* for two weeks to three weeks gives the same live weight. This case was because *lactobacillus* activity on the duration of feeding fermented at P1 and P2 gave the same effect while feeding fermented with *Lactobacillus* for four weeks and five weeks could increase live weight higher than P1 and P2. This result is presumably because of the length of time *Lactobacillus* in the digestive tract can increase the intestinal villi's surface areas, so that nutrient absorption is better, reducing the growth of pathogenic microorganisms. In line with the research results of Ignatova *et al.* (2009), it was shown that giving a probiotic supplement (*Lactobacillus*) for five weeks positively increases the live weight of broilers and livestock products that are safe for consumption.

Feeding fermented with *Lactobacillus* at P2 was significantly different ($p < 0.05$) compared to P3 and P4 on the results of the weight of broiler chickens. It is suspected that the duration of feeding fermented with *Lactobacillus* for three weeks is still in average conditions to produce a live weight. Moreover, because the feed fermented with *Lactobacillus* is given only up to 3 weeks, after more than three weeks, the lactic acid bacteria produced from the *lactobacillus* fermented feed will be less so that the acidic conditions in the digestive tract are normal. According to Rodriguez *et al.* (2010), adding Lactobacillus to the feed will reduce pH and increase the number of microorganisms in the digestive tract, accelerating the growth of digestive organs and allowing them to develop optimally. Feeding fermented with *Lactobacillus* at four weeks and five weeks resulted in high body weight gain. It can be assumed that the more extended feeding fermented with *Lactobacillus* will result in greater body weight.

Feeding fermented feed with *Lactobacillus* for four weeks was significantly different ($p < 0.05$) compared to feeding fermented feed for five weeks. Presumably, the longer the feeding is fermented with Lactobacillus, the more lactic acid bacteria are produced, which lower the digestive tract's pH, facilitating the metabolic process and producing a high body weight. This case follows the opinion of Elbaz *et al.* (2021), which indicated that the use of *Lactobacillus* in feed aims to balance the microflora in the digestive tract to increase the absorption of nutrients to produce ideal body weight.

Carcass percentage

The average percentage of broiler carcass for each treatment during the study can be seen in Table 3. The average percentage of broiler carcasses obtained in this study ranged from 72.02 to 78.39%. The results of the analysis of variance on broiler carcasses showed the addition of fermented feed containing Lactobacillus with 5 weeks curing time (P4) had a significant effect ($p < 0.05$) on the percentage carcasses of broilers. This result was because the duration of feeding fermented with *Lactobacillus* can lower the pH of the digestive tract and facilitate the work of the pepsin enzyme so that protein absorption increases. Baeza *et al.* (2022) stated that the average percentage of broiler carcasses is around 65-78% of the final body weight.

The results of further tests on the percentage carcasses of broiler carcasses showed that the percentage of carcasses in P1 was not significantly different ($p > 0.05$) with P2 but significantly different ($p < 0.05$) with P3 and P4. This result indicated that the effect of feeding fermented feed with *Lactobacillus* for two weeks and three weeks resulted in a carcass percentage of 72.02%-75.02% lower than P3 and P4. This case was because feeding fermented with *Lactobacillus* for two weeks and three weeks has the potential for the growth of pathogenic bacteria such as *salmonella* bacteria because the fermented feed has a function to minimize the growth of *salmonella* pathogenic bacteria so that the protein digestion process assisted by

enzymes will be slower compared to P3 and P4, while the duration of feeding fermented with *Lactobacillus* for four weeks to 5 weeks resulted in a higher carcass percentage than P1 and P2, ranging from 77.64% to 78.39%. On This case was because *Lactobacillus* acts as a growth promoter which can increase the work of the pepsin enzyme in the digestive tract so that the absorption of nutrients in the intestines and the resulting metabolic products can be utilized by the livestock body to form and add new tissues such as meat formation (Ignatova et al., 2009).

Feeding fermented with *Lactobacillus* in treatment P2 was significantly different ($p < 0.05$) with P3 and P4 on the percentage of carcasses. This case is because the length of time of fermented feed with *Lactobacillus* will produce a great percentage of the carcass. After all, *Lactobacillus* will produce lactic acid bacteria, which facilitate the work of the digestive tract, resulting in a high percentage of the carcass. Maunatin and Khanifa (2012) stated that lactic acid bacteria found in the digestive system could neutralize toxins produced by pathogenic bacteria, affecting enzyme activity in the small intestine so that the blood will circulate nutrients throughout the body to form meat.

Feeding fermented feed with *Lactobacillus* at P3 was not significantly different ($p > 0.05$) with P4. This case was because the four-week fermented feed had the same number of *lactobacillus* bacteria as the fermented feed treatment for five weeks, so the enzyme performance produced was the same in the P3 and P4 treatments. One of the increased enzyme performances due to the increase in the microbial population is the pepsin enzyme to break down protein. Then feed nutrients will be absorbed throughout the body to form meat deposition. In line with the research of Mountzouris *et al.* (2010) reported that the use of probiotics in feed can work optimally in the digestive tract by increasing the number of microbial populations, thereby balancing the microflora in the digestive tract, protecting the digestive system, improving intestinal health and increasing livestock productivity.

Abdominal fat percentage

The average percentage of abdominal fat weight ranged from 1.24 to 1.40%. It can be assumed that feeding fermented with *Lactobacillus* facilitates the hydrolysis of carbohydrates in the digestive tract, facilitating the absorption of glucose and monosaccharides. Meanwhile, feed containing easily digestible carbohydrates will result in increased abdominal fat. Following the view of Jha and Mishra (2021), poultry-fed carbohydrate-based diets have a higher abdominal fat content than fibrous; easily digestible carbohydrates tend to be converted into energy reserves in the form of fat. Hidayat (2015) reported that fat formation occurs due to excess energy consumed. Excess energy in broilers will be stored in the form of abdominal fat.

Further test results revealed that the percentage of abdominal fat given fermented feed with *Lactobacillus* at P1 was significantly different ($p < 0.05$) from P2, P3, and P4 in terms of abdominal fat percentage. It is suspected that the feeding duration fermented with *Lactobacillus* at P1 was still in normal condition resulting in a lower percentage of abdominal fat. In contrast, at P2, P3, and P4, the length of feeding fermented with *Lactobacillus* could reduce the activity of the lipase enzyme that plays a role in the rate of acid synthesis. Fouad and El-Senousey (2014) reported that the decrease in abdominal fat deposition with a decrease in the energy content of the ration was caused by the reduced activity of lipase enzymes associated with lipogenic processes in the liver. Lipogenesis is a fat deposition process that includes fatty acid synthesis and triglyceride synthesis that occurs in the liver in the mitochondria, cytoplasm, and adipose tissue. Fat in the body originates from feed and is produced from the synthesis process in the liver (Jensen-Urstad & Semenkovich, 2012). Feeding fermented feed with *Lactobacillus* at P2 and P3 was not significantly different ($p > 0.05$) but significantly different from P4. In this case, presumably because feeding fermented with *Lactobacillus* can optimize the absorption of the digestive tract so that the nutritional content of the feed is more directed at the formation of meat and bones than fat in each treatment. Fouad and El-Senousey (2014) stated that nutrition affects the deposition of abdominal fat in the body of broiler chickens. Reduction of body fat deposits in broilers, including abdominal fat, occurs due to a reduction in fatty acid synthesis in the liver and a decrease in lipase enzyme secretion, thereby reducing fat absorption. Zhang *et al.* (1999) stated that fatty acids reduce the amount of body fat deposition in broilers by suppressing the activity of the lipase enzyme in plasma.

CONCLUSION

According to the present study's findings, adding fermented *Lactobacillus* feed for five weeks could increase body weight gain by 16.30%, decrease feed conversion by 11.10% and improve the carcass quality of broiler chickens. Recommendations for further research are the increased application of fermented feed by lactobacillus as a feed mixture to the number of pathogenic and non-pathogenic microbial populations and the characteristics of the digestive organs in broiler chickens.

Acknowledgments

The authors would like to thank the Incorporated Company Satwa Utama Integrasi as a funding source; and Apriadi, Epanria, and Rafi Megansyah for their assistance during the research.

Authors' contribution

All authors developed the theory and supervised the research. Rizki Palupi contributed to the sample collection and analysis calculations. All authors read and approved the final version of the manuscript for publishing in the present journal.

Competing interests

The authors have declared that no competing interest exists

Ethical consideration

All authors have reviewed the manuscripts for ethical concerns, such as plagiarism, consent to publish, misconduct, data fabrication and falsification, double publishing and submission, and redundancy.

Availability data and material

REFERENCES

Akhadiarto, S. (2010). Pengaruh Pemberian Probiotik Temban, Biovet Dan Biolacta Terhadap Persentase Karkas, Bobot Lemak Abdomen Dan Organ Dalam Ayam Broiler. *Jurnal Sains Dan Teknologi Indonesia*, *12*(1), 53–59. https://doi.org/10.29122/jsti.v12i1.851

Al-Khalaifa, H., Al-Nasser, A., Al-Surayee, T., Al-Kandari, S., Al-Enzi, N., Al-Sharrah, T., Ragheb, G., Al-Qalaf, S., & Mohammed, A. (2019). Effect of dietary probiotics and prebiotics on the performance of broiler chickens. *Poultry Science*, *98*(10), 4465–4479. https://doi.org/10.3382/ps/pez282

Al-Khalaifah, H. S. (2018). Benefits of probiotics and/or prebiotics for antibiotic-reduced poultry. *Poultry Science*, *97*(11), 3807–3815. https://doi.org/10.3382/ps/pey160

Astuti, F K, Busono, W., & Sjofjan, O. (2015). The effect of liquid probiotics in broiler feed for broiler production performance. *EnviIndonesian Journal of Evironment and Sustainable Development*, *6*(2), 99–104. http://repository.ub.ac.id/159019/

Astuti, Farida Kusuma, Busono, W., & Sjofjan, O. (2015). Pengaruh Penambahan Probiotik Cair dalam Pakan Terhadap Penampilan Produksi Pada Ayam Pedaging. *Pembangunan Dan Alam Lestari*, *6*(2), 99–104. https://jpal.ub.ac.id/index.php/jpal/article/view/192/195

Baéza, E., Guillier, L., & Petracci, M. (2022). Review: Production factors affecting poultry carcass and meat quality attributes. *Animal*, *16*(xxxx). https://doi.org/10.1016/j.animal.2021.100331

Elbaz, A. M. (2021). Effects of Diet Containing Fermented Canola Meal on Performance, Blood Parameters, and Gut Health of Broiler Chickens. *Journal of World's Poultry Research*, *11*(1), 01–07. https://doi.org/10.36380/jwpr.2021.1

Fatmaningsih, R., & Nova, K. (2016). Broiler Performance in Conventional Brooding System and Thermos. *Jurnal Ilmiah Peternakan Terpadu*, *4*(3), 222–229.

Fouad, A. M., & El-Senousey, H. K. (2014). Nutritional factors affecting abdominal fat deposition in poultry: A review. *Asian-Australasian Journal of Animal Sciences*, *27*(7), 1057–1068. https://doi.org/10.5713/ajas.2013.13702

Getachew, T. (2016). A Review on Effects of Probiotic Supplementation in Poultry Performance and Cholesterol Levels of Egg and Meat. *Journal of World's Poultry Research*, *6*(61), 31–36. http://jwpr.science-line.com/

Hardiningsih, R., Napitupulu, R. N. R., & Yulinery, T. (2006). Isolation and resistance test of several isolates of Lactobacillus in low pH. Biodiversitas, *7*(1), 15-17.

Hidayat, C. (2015). Reducing Abdominal Fat Deposition in Broiler Through Feeding Management. Indonesian Bulletin of Animal and Veterinary Sciences, *25*(3), 125–134. https://doi.org/10.14334/wartazoa.v25i3.1157

Ignatova, M., Sredkova, V., & Marasheva, V. (2009). Effect of Dietary Inclusion of Probiotic on Chickens Performance and Some Blood Indices. Biotechnology in Animal Husbandry, *25*(6), 1079–1085. http://scindeks.ceon.rs/article.aspx?artid=1450-91560906079I

Jensen-Urstad, A. P. L., & Semenkovich, C. F. (2012). Fatty acid synthase and liver triglyceride metabolism: Housekeeper or messenger? Biochimica et Biophysica Acta - Molecular and Cell Biology of Lipids, *1821*(5), 747–753. https://doi.org/10.1016/j.bbalip.2011.09.017

Jha, R., & Mishra, P. (2021). Dietary fiber in poultry nutrition and their effects on nutrient utilization, performance, gut health, and on the environment: a review. Journal of Animal Science and Biotechnology, *12*(1), 1–16. https://doi.org/10.1186/s40104-021-00576-0

Khempaka, S., Thongkratok, R., Okrathok, S., & Molee, W. (2014). An evaluation of cassava pulp feedstuff fermented with a. oryzae, on growth performance, nutrient digestibility and carcass quality of broilers. Journal of Poultry Science, *51*(1), 71–79. https://doi.org/10.2141/jpsa.0130022

Kiha, A. F., Murningsih, W., & Tristiarti. (2012). Pengaruh Pemeraman Ransum dengan Sari Daun Pepaya terhadap Kecernaan Lemak dan Energi Metabolis Ayam Broiler. Animal Agricultural Journal, *1*(1), 265–276.

Maunatin, A., & Khanifa, K. (2012). Uji Potensi Probiotik Lactobacillus Plantarium Secara In-Vitro. Alchemy, *2*(1), 26–34. https://doi.org/10.18860/al.v0i0.2298

McNaught, C. E., & MacFie, J. (2001). Probiotics in clinical practice: A critical review of the evidence. Nutrition Research, *21*(1–2), 343–353. https://doi.org/10.1016/S0271-5317(00)00286-4

Mountzouris, K. C., Tsitrsikos, P., Palamidi, I., Arvaniti, A., Mohnl, M., Schatzmayr, G., & Fegeros, K. (2010). Effects of probiotic inclusion levels in broiler nutrition on growth performance, nutrient digestibility, plasma immunoglobulins, and cecal microflora composition. Poultry Science, *89*(1), 58–67. https://doi.org/10.3382/ps.2009-00308

Kommentar [P20]: Please add it

Kommentar [P21]: **The references should be carefully revised based on the journal formatting.**
•Revise the name of journal for all references based on the journal format, please.
•It shouldn't be in Italic form and full name of the journal is needed.

Muck, R. E., Nadeau, E. M. G., McAllister, T. A., Contreras-Govea, F. E., Santos, M. C., & Kung, L. (2018). Silage review: Recent advances and future uses of silage additives. Journal of Dairy Science, *101*(5), 3980–4000. https://doi.org/10.3168/jds.2017-13839

Nair, J., Xu, S., Smiley, B., Yang, H. E., McAllister, T. A., & Wang, Y. (2019). Effects of inoculation of corn silage with Lactobacillus spp. or Saccharomyces cerevisiae alone or in combination on silage fermentation characteristics, nutrient digestibility, and growth performance of growing beef cattle. Journal of Animal Science, *97*(12), 4974–4986. https://doi.org/10.1093/jas/skz333

Naji, S. A. H., Al-Gharawi, J. K. M., & Al-Zamili, I. F. B. (2015). The effect of starting age of feeding wetting fermented feed on the intestinal flora, humoral and cellular immunity of broiler chicks. International Journal of Advanced Research, *3*(1), 41–49.

Nurhayati, Wirawati, C. U., & Putri, D. D. (2015). Penggunaan Produk Fermentasi Dan Kunyit Dalam Pakan Terhadap Performan Ayam Pedaging Dan Income Over Feed and Chick Cost. *Zootec*, *35*(2), 379. https://doi.org/10.35792/zot.35.2.2015.9457

Palupi, R., Lubis, F. N. L., & Pratama, A. N. T. (2022). The effect of the use of cassava tuber (Manihot esculenta) and Indigofera zollingeriana leaf flour combination as a source of energy supplemented with citric acid in ration on broiler small intestine characteristics and productivity. Journal of Advanced Veterinary and Animal Research, *9*(3), 471–480. https://doi.org/10.5455/javar.2022.i616

Pradikta, R. W., Sjofjan, O., & Djunaidi, I. H. (2018). Evaluasi penambahan probiotik (Lactobacillus sp) cair dan padat dalam pakan terhadap penampilan produksi ayam petelur. Jurnal Ilmu-Ilmu Peternakan, *28*(3), 203. https://doi.org/10.21776/ub.jiip.2018.028.03.03

Rodríguez-Lecompte, J. C., Brady, J., Camelo-Jaimes, G., Sharif, S., Crow, G., Ramirez-Yanez, G., Guenter, W., & House, J. D. (2010). Intestinal characterization of avian defensins and cytokines after the early administration of probiotic with organic acids in broilers. Avian Immunology Research Group. Budapest, Hungary.

Romero, J. J., Zhao, Y., Balseca-Paredes, M. A., Tiezzi, F., Gutierrez-Rodriguez, E., & Castillo, M. S. (2017). Laboratory silo type and inoculation effects on nutritional composition, fermentation, and bacterial and fungal communities of oat silage. Journal of Dairy Science, *100*(3), 1812–1828. https://doi.org/10.3168/jds.2016-11642

Singracha, P., Niamsiri, N., Visessanguan, W., Lertsiri, S., & Assavanig, A. (2017). Application of lactic acid bacteria and yeasts as starter cultures for reduced-salt soy sauce (moromi) fermentation. LWT - Food Science and Technology, *78*, 181–188. https://doi.org/10.1016/j.lwt.2016.12.019

Steel, R. G. D., & Torrie, J. H. (1980). *Principles and procedures of statistics*. McGraw-Hill.

Sugiharto, S. (2019). A review on fungal fermented cassava pulp as a cheap alternative feedstuff in poultry ration. Journal of World's Poultry Research, *9*(1), 1–6. https://doi.org/10.36380/jwpr.2019.0

Uguru, J. ., Amah, U. ., Umoren, E. ., Unigwe, C. ., Obinna-Echem, P. ., Onainor, E. ., Torhemen, M., & Ucheji, C. (2022). Carcass traits, nutrient composition and sensory properties of broiler chickens fed diets containing graded levels of fermented cassava. Nigerian Journal of Animal Production, *49*(1), 268–283.

Uzer, F., Iriyanti, N., & Roesdiyanto, R. (2013). The Use of Functional Feed In Rations on Consumtion and Body Weight Gain Broiler. Jurnal Ilmiah Peternakan, *1*(1), 282–288.

Widodo, A. R., Setiawan, H., & dan Indreswari, S. R. (2013). Kecernaan Nutrien dan Performan Puyuh (Coturnix coturnix japonica) Jantan yang Diberi Ampas Tahu Fermentasi dalam Ransum. Tropical Animal Husbandry, *2*(1), 51–57.

Wikanatsiri, Utama, C. S., & Suyanto, A. (2012). Aplikasi Proses Fermentasi Kulit Singkong Menggunakan Stater Asal Limbah Kubis dan Sawi pada Pembuatan Pakan Ternak Berpotensi Probiotik. Seminar Hasil Penelitian LPPM Universitas Muhammadiyah Semarang, 281–288.

Zhang, X., Roland, D. A., Mcdaniel, G. R., & Rao, S. K. (1999). Effect of natuphos® phytase supplementation to feed on performance and ileal digestibility of protein and amino acids of broilers. Poultry Science, *78*(11), 1567–1572. https://doi.org/10.1093/ps/78.11.1567

Zulfan, & Zulfikar. (2020). Performances of Broilers Fed the Commercial Diet Partly Substituted by Fermented Feed Based onthe Mixing of Corn, Rice Bran, and Leubim Fish (Canthidermis maculata) Processing By-Product Meal. Jurnal Ilmiah Ilmu-Ilmu Peternakan, *23*(12), 92–103.

8. Bukti konfirmasi Submit hasil revisi ke-tiga

palupi Arda <palupiarda@yahoo.com>
To: editor jwpr

Thu, Feb 9 at 10:32 AM

Dear The Editor JWPR

We herewith submit the results of our revised manuscript
Thank you for your attention and cooperation

Best Regards,
Outhor,

Dr. Rizki Palupi

Show original message

revisi JWPR... .doc
325kB

JWPR
Journal of World's Poultry Research

2022, Scienceline Publication
J. World Poult. Res. 12(1): 00-00, Mar 25, 2022
Research Paper, PII: S2322455X2200000-12

Original Research

Effect of Duration of Feeding Fermented Feed by *Lactobacillus* on Production Performance and Carcass Quality of Broiler Chickens

Rizki Palupi*, Fitri Nova Liya Lubis, Anggriawan Naidilah Tetra Pratama, and Muhakka

Department of Technology and Livestock Industry, Faculty of Agricultural, Sriwijaya University, Indralaya, South Sumatera, Indonesia

*Corresponding author's Email: palupiarda@yahoo.com

Received: xx Mo. 2022
Accepted: xx Mo. 2022

Kommentar [P1]: Please paraphrase the title
of is repeated 3 times and feeding fermented feed should be paraphrased.

Kommentar [a2R1]: Effect of Duration of Fermented Feed by *Lactobacillus* in Rations on Production Performance and Carcass Quality of Broiler Chickens

ABSTRACT

The quality of broiler chicken carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production. The study aimed to determine the effect of feeding fermented feed at different times on the production performance and quality of broiler chicken carcasses. The number of Day Old Chick (DOC) used in this study was 180 broiler chickens strain Cobb. This study was carried out experimentally using a Complete Randomized Design consisting of 4 treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); 3 weeks (P2); 4 weeks (P3); and five weeks (P4). Experimental parameters include ration consumption, weight gain, and ration conversion. In addition, the quality of carcasses is also observed: live weight, carcass percentage, and percentage of broiler chicken abdominal fat. The results showed that the longer the time of fermentation feed significantly increased ration consumption by 40.07% and increased 13.77% weight gain, as well as decreased ration conversion by 25.33%. Furthermore, the same results were also shown in the observation of live weight by 17.80% and increased the percentage of the carcass by 8.84% while the percentage of abdominal fat decreased by 12.90%. Based on these results, it was concluded that the provision of fermented feed for 5 weeks can improve the production performance and carcass quality of broiler chickens.

Keywords: Broiler chicken, Carcass quality, Fermented feed, Performance

INTRODUCTION

Broiler chickens have a role as a source of animal protein that is in demand by consumers. This demand is because broiler chicken carcasses can be produced faster than other livestock. However, the quality of broiler carcasses is greatly influenced by feed management and the number of nutrients digested in the digestive tract that will be utilized for optimal meat production (Baéza et al., 2022). Various attempts have been made to increase the amount of digested nutrients and increase digestibility by processing feed before consumption. Feed processing that can be pursued is fermenting the feed. One of the feed processing that can be done is by fermenting the feed. The fermentation process can increase feed digestibility and crude protein content and reduce crude fiber in feed (Khempaka et al., 2014). The fermented feed provides several benefits, including improving nutritional properties (reducing fiber and increasing protein content) and intestinal health. It will accelerate broiler chicken's growth (Sugiharto, 2019).

The fermentation process requires an inoculant to speed up the breakdown of nutrients in the feed (Romero et al., 2017). One of the inoculants that can be used is by adding *Lactobacillus*. *Lactobacillus* are lactic acid bacteria that are often used in the fermentation process (Nair et al., 2019; Romero et al., 2017; Singracha et al., 2017). Lactic acid bacteria will grow and develop on the substrate during fermentation, so the feed contains probiotics utilized by livestock to help the food digestion process. Astuti et al. (2015) reported that probiotics could be given at a concentration of 0.6 v/w in broiler up to 28 days of age. The higher the level of the probiotic *Lactobacillus* species in feed, the better the effect on the growth

(Pradikta et al., 2018). Previously, Mcnaught and MacFie (2001) stated that many probiotics could attach firmly to intestinal cells, including several types of lactic acid bacteria, such as *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus plantarum,* and a large number of *Bifidobacteria*. The ability to stick to the digestive tract will cause probiotic microbes to develop appropriately, and pathogenic microbes such as *Escherichia coli* and *Salmonella Typhimurium* in the digestive tract will be reduced from the animal host cells (McNaught & MacFie, 2001).

The feeding duration of specific feeds will allow probiotics to stick to poultry's digestive tract for a more extended period, affecting livestock production (Al-Khalaifa et al., 2019; Al-Khalaifah, 2018). The results of the research by Zulfan et al. (2020) and Naji et al. (2015) reported that fermented feed ingredients could be given in commercial rations without disturbing the growth and increasing the income over feed costs of broiler. Furthermore, feeding in the early phase of growth or during the brooding period can affect the growth of broiler DOC (Al-Khalaifa et al., 2019). When chicks are 1 to 14 days old, cell multiplication or hyperplasia will occur. The multiplication of these cells includes the development of the digestive tract, respiratory tract, and immune system. Body cells will increase in number by way of cell division. The hyperplasia process will affect further growth in the form of hypertropia growth, cells will increase in size or cell maturation (Fatmaningsih and Nova, 2016). Based on the description above, a study was aimed to determine the effect of fermented feed at different times on the production performance and carcass quality of broiler chickens.

MATERIALS AND METHODS

Ethical approval

An animal feeding experiment was conducted at the experimental station, Department of Animal Science, Faculty of Agriculture, Universitas Sriwijaya, South Sumatera, Indonesia. The animals were cared for according to the Indonesian Institute of Sciences Animal Welfare Guidelines. The approval of the experiment was granted from Universitas Sriwijaya with approval number KPPHP-2021-1.

Method and sampling preparation

This study used 180 one-day-old chicks (DOC) of Cobb strain broilers obtained from Charoen Pokphand, Indonesia with an average weight of 38 g and placed in 20 postal cages with a size of 100 cm x 100 cm. Nine broilers were placed in each cage. The cages had food dishes, water containers, and 60-watt incandescent lamps for lighting and warmth while the chicks were in them. The feed used during the starter period was HI Pro (Charoen Pokphand, Indonesia), the feed is given to DOC up to the age of 14 days, and at the time, the finisher was MR1-P (Cheiljedang, Indonesia), the finisher feed given at the age of 3 weeks to 5 weeks of age. The composition of the nutrients in the feed used during the study is shown in Table 1.

Before the feed is given to the experimental animals, the feed is fermented for 7 days using Super lacto which contains the *Lactobacillus burlgarius* bacteria and is a product of the Central Proteina Prima Tbk company, Indonesia. The fermentation process is carried out by diluting Super lacto at a concentration of 15 percent based on the rules for use on the product label. After that, proceed with the feed inoculation process by spraying the inoculant evenly (4% w/v).

As for the measurement of carcass quality in research carried out at the final stage of the study. Samples were taken randomly as many as 2 in each treatment and replicated. Then the chicken samples were fasted for 8 hours before being slaughtered.

Table 1. Nutrient composition of feed given at the starter and finisher period in broiler chickens strain cobb

Nutrient	Starter feed (HI Pro)*	Finisher feed (MR1 – P)**
Water content (%)	13	13
Crude protein (%)	22.00-23.00	21.50-23.00
Crude fibre (%)	5.00	4.00
Fat (%)	5.00	8.00
Ash (%)	7.00	6.50
Calcium (%)	0.90	0.90-1.20
Phosphor (%)	0.60	0.70-1.00
Metabolizable energy (kcal/kg)	3,020-3,120	2,750-2,768
Methionine	0.61	0.56
Methionin+Cyistein	0.78	0.75
Lysine	1.28	1.28
Vitamin C (IU)	300	300
Selenium (ppm)	0.1	0.5

* Incorporated Company Charoen Pokphand, Indonesia, produces the feed.
** Incorporated Company Cheil Jedang Super Feed, Lampung produce the feed.

Experimental design

Kommentar [P6]: Which days did you consider starter?

Kommentar [P7R6]: Pay attention to the comment

Kommentar [a8R6]: the starter period starts from DOC aged 1 day up to 21 days old

Kommentar [P9]: Which days did you consider finisher?

Kommentar [P10R9]: Pay attention to the comment

Kommentar [a11R9]: broiler chicken finisher period after the starter period, which starts at the age of 22 days until the age of 35 days

Kommentar [P3]: What were the temperature and humidity rate?

Kommentar [P4R3]: Pay attention to the comment

Kommentar [a5R3]: the temperature of the cage environment when conducting the study ranged from 32.2 - 33.0 Celsius with humidity ranged from 68.1 to 85.7

This research was conducted using a Completely Randomized Design (CRD) consisting of four treatments and five replications. Each treatment carried out in this experiment consisted of a different length of time, namely feeding for two weeks (P1); three weeks (P2); four weeks (P3); and five weeks (P4).

Observed variables

All parameters for calculating the value of observations made in this study are based on research conducted by Palupi et al. (2022).

Feed Consumption

The investigated parameters included consumption of ration (g/head/day), which was measured based on the difference between the ration given (g) and the rest of the ration given (g) during a specific period (days).

Body weight gain

Body weight gain (g/head/day), was measured by weighing the difference between body weight at the end of the study (g) and the initial body weight (g), then divided by the length of rearing time (days).

Feed Conversion Ratio (FCR)

Conversion of rations measured based on the ratio between weight gain and ration consumption.

Live weight

Then measure, the quality of the broiler carcass, including; Live weight, was measured based on the results of weighing at the end of the study (g).

Carcass percentage

Percentage of the carcass (%), which is calculated based on the percentage of weight comparison of broilers without blood, feathers, head, legs, and digestive organs (g) divided by live weight (g).

Percentage of abdominal fat

Percentage of abdominal fat (%), which is calculated based on the percentage of the comparison between the weight of abdominal fat contained in the abdominal cavity and fat attached to the digestive organs (g) with the live weight of broilers (g).

Statistical analysis

The data will be processed using SPSS software (version 20), based on the design used. Analysis of Variance (ANOVA) analyzes data from observation during the study. If there is a significant difference, a further test is carried out using Duncan's Multiple Range Test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Production performance

The average Performance of broiler production observed during the research was ration consumption, body weight gain, and feed conversion. The data are presented in Table 2.

Table 2. Production performance at the starter and finisher period in broiler chicken strain cobb

Treatment	Feed consumption (g/head/day)	Weight gain (g/head/day)	Feed conversion ratio
P1	78.17 ± 3.45^{a}	51.83 ± 6.24^{a}	1.50 ± 0.22^{a}
P2	86.71 ± 4.12^{b}	55.55 ± 4.88^{a}	1.56 ± 1.45^{a}
P3	96.43 ± 3.41^{c}	60.28 ± 5.61^{b}	1.60 ± 1.03^{a}
P4	118.24 ± 2.66^{d}	65.80 ± 3.87^{b}	1.80 ± 1.56^{b}

[abc] Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed for 4 weeks, P4 = fermented feed for 5 weeks

Ration consumption

The analysis of variance revealed that the duration of feeding fermented with *Lactobacillus* had a significant effect on the consumption of broiler chicken ration ($p < 0.05$). The average consumption of broiler rations during the study ranged from 78.17 to 118.24 (g/head/day). The most extended fermented feed would affect the ration consumption; this was assumed because adding feed fermented with *Lactobacillus* has better palatability, so broilers prefer it. Widodo et al. (2013) reported that fermented feed could be given to a level of 15% in the ration, because fermented feed with *Lactobacillus* provides aromas, flavors, and shapes that broilers prefer, thereby increasing ration consumption.

Further test results showed that the consumption ratio of P1 was significantly different from P2 ($p < 0.05$). It was hypothesized that the increased consumption at each treatment in this study was due to the duration of the feed fermented with *Lactobacillus* supplementation, which could lead to improved feed quality. Widodo et al. (2013) found that fermented feed had improved quality compared to feed that had not undergone the fermentation process. This improvement in feed quality is because the feed contains *Lactobacillus*, which helps speed up the digestive process, thereby improving the digestibility of the feed. Getachew (2016) reported that lactic acid bacteria could live and grow in the intestine and produce enzymes, such as proteases and amylases, which could help improve digestion and produce short-chain fatty acids with antibacterial properties to protect nutritive feed. Therefore, feed intake can be improved by adding feed fermented with lactic acid bacteria.

Feed consumption in P2 was significantly different from P3, suggesting that the increased consumption was due to the palatability of the lactobacillus-fermented feed, which was preferred by livestock ($p < 0.05$). Furthermore, the lactic acid produced by lactobacilli in the gut plays a

Kommentar [P18]: Not italic
Please revise it in whole the text.

Kommentar [a19R18]: We will revise it

Kommentar [P12]: How many chicks slaughtered in each group for analysis of these parameters?

Kommentar [AN13R12]: We think it was clear. because each broiler chicken was slaughtered

Kommentar [P14R12]: Do you mean all chickens were slaughtered? Generally, a specific number of each group should be slaughtered.

Kommentar [a15R12]: Carcass quality parameters were measured at the end of the study. Slaughtering of chickens is done as many as 2 chickens every replication.

Kommentar [P16]: What was the significant level?

Kommentar [a17R16]: significant level is the effect of treatment on each parameter observed

tremendous role in eliminating pathogenic bacteria and maximizing the digestibility of the feed by ensuring that there is no competition for the utilization of the nutrients ingested. This statement is believed to be due to its impact on consumption (Wikanatsiri et al., 2012).

The consumption of rations at P3 was significantly different from that in P4 ($p < 0.05$), it was suspected that feed fermented with *Lactobacillus* could improve palatability. Furthermore, throughout these 4-5 weeks of treatment, the amount of *Lactobacillus* in the intestine could be increased so that the more extended feeding fermented with *Lactobacillus* caused the more significant population of *Lactobacillus* in the digestive tract of broilers, which caused the ratio consumption and feed digestibility increased. Elbaz (2021) reported that broiler rations supplemented with *Lactobacillus* could increase palatability, feed consumption, broiler immune system (health), productivity, efficiency, and feed consumption. According to Hardiningsih et al. (2006), the benefits of providing *Lactobacillus* in mixed feed to broilers were increased palatability; maintaining microflora; helping increase digestive enzyme activity; reducing bacterial enzyme activity and ammonia production; increased ration consumption and digestion; neutralizing both enterotoxins and toxins; and also stimulates the immune system.

Body weight gain

The analysis of variance showed that the feed fermented with *Lactobacillus* had a significant effect ($p < 0.05$) on the increase in the body weight of broilers. It is suspected that feed fermented with *Lactobacillus* can increase feed digestibility in the digestive tract. Astuti et al. (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect broilers' growth because *Lactobacillus* bacteria can break down simple carbohydrates into lactic acid. *Lactobacillus* bacteria can maintain the balance of other beneficial bacteria populations in the small intestine so that feed digestibility improves, affecting the increase in broilers' body weight.

The results of further tests showed that the body weight gain of broilers in treatment P1 was not significantly different ($p > 0.05$) with treatment P2 but significantly different ($p < 0.05$) with treatment P3 and P4. This result is thought to be due to the number of *Lactobacillus* in the digestive tract of broiler chickens because the P1 treatment is the same as the P2 treatment; this could be due to various factors. Uzer et al. (2013) *Lactobacilli* maintain beneficial microflora in the gastrointestinal tract, conversely, suppress the growth of pathogenic bacteria, increase digestive enzyme activity, decrease bacterial enzyme activity and ammonia production, increase food intake and digestion, and enterotoxins and neutralize immunity. A stimulating system that does not compete in digesting food.

The body weight gain of broilers in P2 was significantly different from that in P3 ($p < 0.05$); it was suspected that feed fermented with *Lactobacillus* was able to protect the digestive tract from pathogenic bacteria and streamline feed consumption. Astuti et al. (2015) reported that increasing the number of *Lactobacillus* in the intestine will positively affect the growth of chickens which could break down simple carbohydrates into lactic acid. *Lactobacillus*, in addition to maintaining the digestive tract and improving the nutritional value of feed. Body weight gain is closely related to feeding in terms of quantity related to feeding consumption. If feed consumption is disturbed, it will interfere with growth and vice versa; if feed consumption is sufficient, it will increase broiler body weight. The growth of various types of broiler chickens is highly dependent on the feed consumed and is also determined by the development of the digestive tract (Fanatico et al., 2005; Torrey et al., 2021; Singh et al., 2021)

The weight gains of broilers in the P1 and P2 treatments were significantly different from that in P3 and P4 treatments ($p < 0.05$). It is suspected that feeding fermented feed with *Lactobacillus* can increase body weight gain due to its ability to suppress pathogenic bacteria. Furthermore, it can also increase feed digestibility, which has the effect of increasing the digestibility of protein, where feed fermented with *Lactobacillus* produces proteolytic enzymes in the digestive tract, which then can help digest protein, thereby increasing body weight (Muck et al., 2018). A fermented feed with *Lactobacillus*, suppressing pathogenic bacteria, can also improve the digestive organs, stimulating bile and pancreatic juice so that it affects the body weight gain of broiler chickens (Uguru et al., 2022). Nurhayati et al. (2015) reported that the use of fermented feed in broiler chickens has the function of increasing the work of the digestive organs of broilers, namely stimulating the gallbladder wall to secrete bile and stimulating the secretion of pancreatic juice, which contains amylase, lipase, and protease enzymes to improve the digestion of feed ingredients such as carbohydrates, fats, and proteins. Thus, the more extended feeding of fermented feed with *Lactobacillus* resulted in better body weight gain.

Ration conversion ratio

The analysis of variance showed that the addition of fermented feed containing *Lactobacillus* with 5 weeks curing time (P4) had a significant effect ($p < 0.05$) on the conversion of broiler rations. It was reported that the role of fermented *Lactobacillus* in feed is essential because the feed provided is efficient in increasing the body weight of broilers Lactobacillus is a gram-positive microorganism found in milk, fruits and soil. These lactobacilli can maintain the natural balance of the chicken intestine, so they can function as natural antibiotics (Chen et al., 2005; Chen et al., 2017). Kiha et al. (2012) indicated that *Lactobacillus* in the digestive tract could suppress pathogenic bacteria, so they do not compete in digesting nutrients and maximize nutrient absorption in the digestive tract. The longer addition of feed fermented with

Kommentar [P20]: Add the reference

Kommentar [P21R20]: Please add the reference.

Kommentar [a22R20]: The growth of various types of broiler chickens is highly dependent on the feed consumed and is also determined by the development of the digestive tract (Fanatico et al., 2005; Torrey et al., 2021; Singh et al., 2021)

Kommentar [P23]: With which bacteria?

Kommentar [P24R23]: Pay attention to the comment

Kommentar [a25R23]: The bacteria used are Lactobacillus

Lactobacillus can increase the body weight gain of broiler chickens; in addition, the increase in body weight of broiler chickens can be influenced by the consumption of feed and the nutritional content contained in the feed or the consumption of nutrients in the feed. The longer the feeding time fermented with *Lactobacillus*, the greater the body weight gain.

Carcass quality

The average carcass quality of broilers during the study observed was live weight, carcass percentage, and abdominal fat percentage. The data are presented in Table 3.

Table 3. Average carcass quality of broiler chickens

Treatment	Live body weight (g)	Carcass percentage (%)	Abdomen fat percentage (%)
P1	1699.50 ± 13.44[a]	72.02 ± 6.43[a]	1.24 ± 0.12[a]
P2	1797.50 ± 21.06[a]	75.02 ± 11.03[a]	1.32 ± 0.11[b]
P3	1900.75 ± 20.11[b]	77.65 ± 5.44[b]	1.40 ± 0.80[b]
P4	2002.00 ± 16.37[c]	78.39 ± 7.18[b]	1.34 ± 0.32[b]

[abc] Different superscript letters in the same column showed a significant difference ($p < 0.05$). P1 = fermented feed for two weeks, P2 = fermented feed for three weeks. P3 = fermented feed four weeks, P4 = fermented feed five weeks

Live body weight

The average live weight obtained in this study ranged between 1699.50-2002.00 gr. The results of the analysis of diversity on the final weight of broiler chickens showed the addition of fermented feed containing *Lactobacillus* with 5 weeks curing time (P4) had a significant effect ($p < 0.05$) on the live weight of broiler chickens. It is suspected that *Lactobacillus* can produce lactic acid in the digestive tract so that it can lower the pH in the digestive tract. Low pH conditions will multiply beneficial bacteria, allowing for faster nutrient absorption and increased growth, affecting broiler chickens' live weight (Akhadiarto, 2010). On the other hand, based on this results revealed that the live weight of broiler chickens at P1 was not significantly different ($p > 0.05$) from P2 but was significantly different ($p < 0.05$) from P3 and P4 regarding the live weight of broilers. This result shows that the effect of feeding time fermented with *Lactobacillus* for two weeks to three weeks gives the same live weight. This case was because *lactobacillus* activity on the duration of feeding fermented at P1 and P2 gave the same effect while feeding fermented with *Lactobacillus* for four weeks and five weeks could increase live weight higher than P1 and P2. This result is presumably because of the length of time *Lactobacillus* in the digestive tract can increase the intestinal villi's surface areas, so that nutrient absorption is better, reducing the growth of pathogenic microorganisms. In line with the research results of Ignatova et al. (2009), it was shown that giving a probiotic supplement (*Lactobacillus*) for five weeks positively increases the live weight of broilers and livestock products that are safe for consumption.

Feeding fermented with *Lactobacillus* at P2 was significantly different ($p < 0.05$) compared to P3 and P4 on the results of the weight of broiler chickens. It is suspected that the duration of feeding fermented with *Lactobacillus* for three weeks is still in average conditions to produce a live weight. Moreover, because the feed fermented with *Lactobacillus* is given only up to 3 weeks, after more than three weeks, the lactic acid bacteria produced from the *lactobacillus* fermented feed will be less so that the acidic conditions in the digestive tract are normal. According to Rodriguez et al. (2010), adding Lactobacillus to the feed will reduce pH and increase the number of microorganisms in the digestive tract, accelerating the growth of digestive organs and allowing them to develop optimally. Feeding fermented with *Lactobacillus* at four weeks and five weeks resulted in high body weight gain. It can be assumed that the more extended feeding fermented with *Lactobacillus* will result in greater body weight.

Feeding fermented feed with *Lactobacillus* for four weeks was significantly different ($p < 0.05$) compared to feeding fermented feed for five weeks. Presumably, the longer the feeding is fermented with Lactobacillus, the more lactic acid bacteria are produced, which lower the digestive tract's pH, facilitating the metabolic process and producing a high body weight. This case follows the opinion of Elbaz et al. (2021), which indicated that the use of *Lactobacillus* in feed aims to balance the microflora in the digestive tract to increase the absorption of nutrients to produce ideal body weight.

Carcass percentage

The average percentage of broiler carcass for each treatment during the study can be seen in Table 3. The average percentage of broiler carcasses obtained in this study ranged from 72.02 to 78.39%. The results of the analysis of variance on broiler carcasses showed the addition of fermented feed containing Lactobacillus with 5 weeks curing time (P4) had a significant effect ($p < 0.05$) on the percentage carcasses of broilers. This result was because the duration of feeding fermented with *Lactobacillus* can lower the pH of the digestive tract and facilitate the work of the pepsin enzyme so that protein absorption increases. Baeza et al. (2022) stated that the average percentage of broiler carcasses is around 65-78% of the final body weight.

The results of further tests on the percentage carcasses of broiler carcasses showed that the percentage of carcasses in P1 was not significantly different ($p > 0.05$) with P2 but significantly different ($p < 0.05$) with P3 and P4. This result indicated that the effect of feeding fermented feed

Kommentar [P26]: Rephrase it

Kommentar [a27R26]: The longer the duration of feeding that has been fermented with Lactobacillus,

with *Lactobacillus* for two weeks and three weeks resulted in a carcass percentage of 72.02%-75.02% lower than P3 and P4. This case was because feeding fermented with *Lactobacillus* for two weeks and three weeks has the potential for the growth of pathogenic bacteria such as *salmonella* bacteria because the fermented feed has a function to minimize the growth of *salmonella* pathogenic bacteria so that the protein digestion process assisted by enzymes will be slower compared to P3 and P4, while the duration of feeding fermented with *Lactobacillus* for four weeks to 5 weeks resulted in a higher carcass percentage than P1 and P2, ranging from 77.64% to 78.39%. On This case was because *Lactobacillus* acts as a growth promoter which can increase the work of the pepsin enzyme in the digestive tract so that the absorption of nutrients in the intestines and the resulting metabolic products can be utilized by the livestock body to form and add new tissues such as meat formation (Ignatova et al., 2009).

Feeding fermented with *Lactobacillus* in treatment P2 was significantly different ($p < 0.05$) with P3 and P4 on the percentage of carcasses. This case is because the length of time of fermented feed with *Lactobacillus* will produce a great percentage of the carcass. After all, *Lactobacillus* will produce lactic acid bacteria, which facilitate the work of the digestive tract, resulting in a high percentage of the carcass. Maunatin and Khanifa (2012) stated that lactic acid bacteria found in the digestive system could neutralize toxins produced by pathogenic bacteria, affecting enzyme activity in the small intestine so that the blood will circulate nutrients throughout the body to form meat.

Feeding fermented feed with *Lactobacillus* at P3 was not significantly different ($p > 0.05$) with P4. This case was because the four-week fermented feed had the same number of *lactobacillus* bacteria as the fermented feed treatment for five weeks, so the enzyme performance produced was the same in the P3 and P4 treatments. One of the increased enzyme performances due to the increase in the microbial population is the pepsin enzyme to break down protein. Then feed nutrients will be absorbed throughout the body to form meat deposition. In line with the research of Mountzouris *et al.* (2010) reported that the use of probiotics in feed can work optimally in the digestive tract by increasing the number of microbial populations, thereby balancing the microflora in the digestive tract, protecting the digestive system, improving intestinal health and increasing livestock productivity.

Abdominal fat percentage

The average percentage of abdominal fat weight ranged from 1.24 to 1.40%. It can be assumed that feeding fermented with *Lactobacillus* facilitates the hydrolysis of carbohydrates in the digestive tract, facilitating the absorption of glucose and monosaccharides. Meanwhile, feed containing easily digestible carbohydrates will result in increased abdominal fat. Following the view of Jha and Mishra (2021), poultry-fed carbohydrate-based diets have a higher abdominal fat content than fibrous; easily digestible carbohydrates tend to be converted into energy reserves in the form of fat. Hidayat (2015) reported that fat formation occurs due to excess energy consumed. Excess energy in broilers will be stored in the form of abdominal fat.

Further test results revealed that the percentage of abdominal fat given fermented feed with *Lactobacillus* at P1 was significantly different ($p < 0.05$) from P2, P3, and P4 in terms of abdominal fat percentage. It is suspected that the feeding duration fermented with *Lactobacillus* at P1 was still in normal condition resulting in a lower percentage of abdominal fat. In contrast, at P2, P3, and P4, the length of feeding fermented with *Lactobacillus* could reduce the activity of the lipase enzyme that plays a role in the rate of acid synthesis. Fouad and El-Senousey (2014) reported that the decrease in abdominal fat deposition with a decrease in the energy content of the ration was caused by the reduced activity of lipase enzymes associated with lipogenic processes in the liver. Lipogenesis is a fat deposition process that includes fatty acid synthesis and triglyceride synthesis that occurs in the liver in the mitochondria, cytoplasm, and adipose tissue. Fat in the body originates from feed and is produced from the synthesis process in the liver (Jensen-Urstad & Semenkovich, 2012). Feeding fermented feed with *Lactobacillus* at P2 and P3 was not significantly different ($p > 0.05$) but significantly different from P4. In this case, presumably because feeding fermented with *Lactobacillus* can optimize the absorption of the digestive tract so that the nutritional content of the feed is more directed at the formation of meat and bones than fat in each treatment. Fouad and El-Senousey (2014) stated that nutrition affects the deposition of abdominal fat in the body of broiler chickens. Reduction of body fat deposits in broilers, including abdominal fat, occurs due to a reduction in fatty acid synthesis in the liver and a decrease in lipase enzyme secretion, thereby reducing fat absorption. Zhang et al. (1999) stated that fatty acids reduce the amount of body fat deposition in broilers by suppressing the activity of the lipase enzyme in plasma.

CONCLUSION

According to the present study's findings, adding fermented *Lactobacillus* feed for five weeks could increase body weight gain by 16.30%, decrease feed conversion by 11.10% and improve the carcass quality of broiler chickens. Recommendations for further research are the increased application of fermented feed by lactobacillus as a feed mixture to the number of pathogenic and non-pathogenic microbial populations and the characteristics of the digestive organs in broiler chickens.

Acknowledgments

The authors would like to thank the Incorporated Company Satwa Utama Integrasi as a funding source; and Apriadi, Epanria, and Rafi Megansyah for their assistance

during the research.

Authors' contribution

All authors developed the theory and supervised the research. Rizki Palupi contributed to the sample collection and analysis calculations. All authors read and approved the final version of the manuscript for publishing in the present journal.

Competing interests

The authors have declared that no competing interest exists

Ethical consideration

All authors have reviewed the manuscripts for ethical concerns, such as plagiarism, consent to publish, misconduct, data fabrication and falsification, double publishing and submission, and redundancy.

~~Availability data and material~~

REFERENCES

Akhadiarto S. (2010). Pengaruh Pemberian Probiotik Temban, Biovet dan Biolacta Terhadap Persentase Karkas, Bobot Lemak Abdomen Dan Organ Dalam Ayam Broiler. Jurnal Sains Dan Teknologi Indonesia, 12(1): 53–59. DOI: https://doi.org/10.29122/jsti.v12i1.851

Al-Khalaifa H, Al-Nasser A, Al-Surayee T, Al-Kandari S, Al-Enzi N, Al-Sharrah T, Ragheb G, Al-Qalaf S and Mohammed A. (2019). Effect of dietary probiotics and prebiotics on the performance of broiler chickens. Poultry Science, 98(10): 4465–4479. DOI: https://doi.org/10.3382/ps/pez282

Al-Khalaifah HS. (2018). Benefits of probiotics and/or prebiotics for antibiotic-reduced poultry. Poultry Science, 97(11): 3807–3815. DOI: https://doi.org/10.3382/ps/pey160

Astuti, Farida K, Busono W and Sjofjan O. (2015). The effect of liquid probiotics in broiler feed for broiler production performance. EnviIndonesian Journal of Evironment and Sustainable Development, 6(2): 99–104.

Baéza E, Guillier L and Petracci M. (2022). Review: Production factors affecting poultry carcass and meat quality attributes. Animal, 16(1): 1-15. DOI: https://doi.org/10.1016/j.animal.2021.100331

Chen CY, Chen SW and Wang HT. (2017). Effect of supplementation of yeast with bacteriocin and Lactobacillus culture on growth performance, cecal fermentation, microbiota composition, and blood characteristics in broiler chickens. Asian Australia Journal Animal Science, 30:211–220. DOI: doi:10.5713/ajas.16.0203

Chen YS, Yanagida F and Shinohara T. (2005). Isolation and identification of lactic acid bacteria from soil using an enrichment procedure. Letters in Applied Microbiology, 40(3):195–200. DOI:10.1111/j.1472-765X.2005.01653.x

Elbaz AM. (2021). Effects of Diet Containing Fermented Canola Meal on Performance, Blood Parameters, and Gut Health of Broiler Chickens. Journal of World's Poultry Research, 11(1): 01–07. DOI: https://doi.org/10.36380/jwpr.2021.1

Fanatico AC, Pillai PB, Hester PY, Falcone C, Mench JA, Owens CM and Emmert JL. (2008). Performance, livability, and carcass yield of slow- and fast-growing chicken genotypes fed low-nutrient or standard diets and raised indoors or with outdoor access. Poultry Science, 87:1012–1021. DOI: https://doi.org/10.3382/ps.2006-00424

Fatmaningsih R and Nova K. (2016). Broiler Performance in Conventional Brooding System and Thermos. Jurnal Ilmiah Peternakan Terpadu, 4(3): 222–229.

Fouad AM and El-Senousey HK. (2014). Nutritional factors affecting abdominal fat deposition in poultry: A review. Asian-Australasian Journal of Animal Sciences, 27(7): 1057–1068. DOI: https://doi.org/10.5713/ajas.2013.13702

Getachew T. (2016). A Review on Effects of Probiotic Supplementation in Poultry Performance and Cholesterol Levels of Egg and Meat. Journal of World's Poultry Research, 6(61): 31–36.

Hardiningsih R, Napitupulu RNR and Yulinery T. (2006). Isolation and resistance test of several isolates of Lactobacillus in low pH. Biodiversitas, 7(1): 15-17.

Hidayat C. (2015). Reducing Abdominal Fat Deposition in Broiler Through Feeding Management. Indonesian Bulletin of Animal and Veterinary Sciences, 25(3): 125–134. DOI: https://doi.org/10.14334/wartazoa.v25i3.1157

Ignatova M, Sredkova V and Marasheva V. (2009). Effect of Dietary Inclusion of Probiotic on Chickens Performance and Some Blood Indices. Biotechnology in Animal Husbandry, 25(6): 1079–1085.

Jensen-Urstad APL and Semenkovich CF. (2012). Fatty acid synthase and liver triglyceride metabolism: Housekeeper or messenger? Biochimica et Biophysica Acta - Molecular and Cell Biology of Lipids, 1821(5): 747–753. DOI: https://doi.org/10.1016/j.bbalip.2011.09.017

Jha R and Mishra P. (2021). Dietary fiber in poultry nutrition and their effects on nutrient utilization, performance, gut health, and on the environment: a review. Journal of Animal Science and Biotechnology, 12(1): 1–16. DOI: https://doi.org/10.1186/s40104-021-00576-0

Khempaka S, Thongkratok R, Okrathok S and Molee W. (2014). An evaluation of cassava pulp feedstuff fermented with a. oryzae, on growth performance, nutrient digestibility and carcass quality of broilers. Journal of Poultry Science, 51(1): 71–79. DOI: https://doi.org/10.2141/jpsa.0130022

Kiha AF, Murningsih W and Tristiarti. (2012). Pengaruh Pemeraman Ransum dengan Sari Daun Pepaya terhadap Kecernaan Lemak dan Energi Metabolis

Kommentar [P28]: Please add it

Kommentar [P29]: **The references should be carefully revised based on the journal formatting.**
•Revise the name of journal for all references based on the journal format, please.
•It shouldn't be in Italic form and full name of the journal is needed.

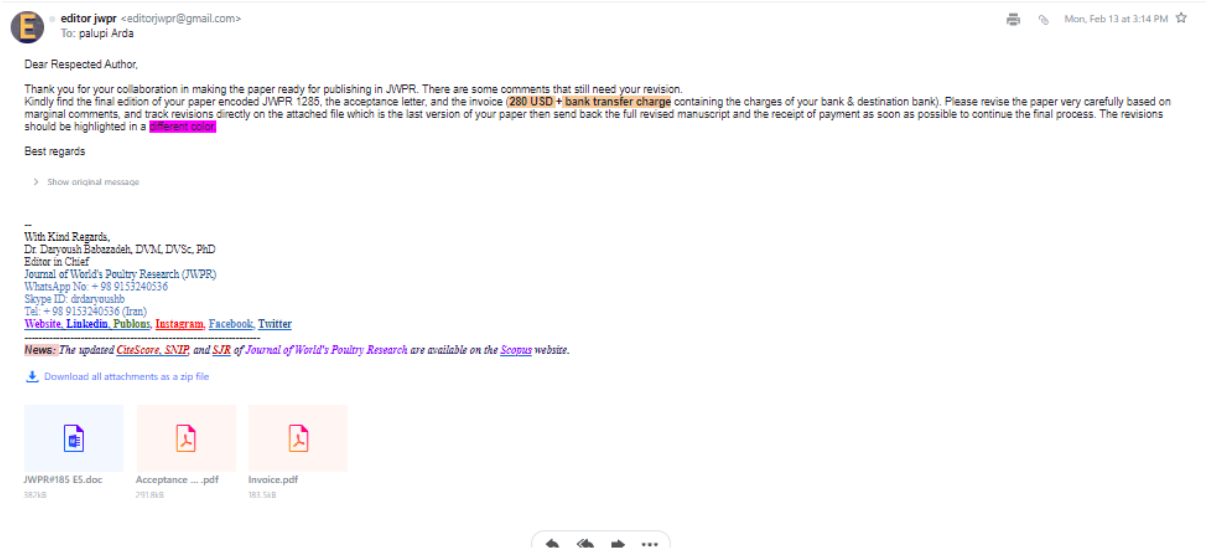
Ayam Broiler. Animal Agricultural Journal, 1(1), 265–276.
Maunatin A and Khanifa K. (2012). Uji Potensi Probiotik Lactobacillus Plantarium Secara In-Vitro. Alchemy, 2(1): 26–34. DOI: https://doi.org/10.18860/al.v0i0.2298
McNaught CE and MacFie J. (2001). Probiotics in clinical practice: A critical review of the evidence. Nutrition Research, 21(1–2), 343–353. DOI: https://doi.org/10.1016/S0271-5317(00)00286-4
Mountzouris KC, Tsitrsikos P, Palamidi I, Arvaniti A, Mohnl M, Schatzmayr G and Fegeros K. (2010). Effects of probiotic inclusion levels in broier nutrition on growth performance, nutrient digestibility, plasma immunoglobulins, and cecal microflora composition. Poultry Science, 89(1): 58–67. DOI: https://doi.org/10.3382/ps.2009-00308
Muck RE, Nadeau EMG, McAllister TA, Contreras-Govea FE, Santos MC and Kung L. (2018). Silage review: Recent advances and future uses of silage additives. Journal of Dairy Science, 101(5): 3980–4000. DOI: https://doi.org/10.3168/jds.2017-13839
Nair J, Xu S, Smiley B, Yang HE, McAllister TA and Wang Y. (2019). Effects of inoculation of corn silage with Lactobacillus spp. or Saccharomyces cerevisiae alone or in combination on silage fermentation characteristics, nutrient digestibility, and growth performance of growing beef cattle. Journal of Animal Science, 97(12): 4974–4986. DOI: https://doi.org/10.1093/jas/skz333
Naji SAH, Al-Gharawi JKM and Al-Zamili IFB. (2015). The effect of starting age of feeding wetting fermented feed on the intestinal flora, humoral and cellular immunity of broiler chicks. International Journal of Advanced Research, 3(1): 41–49.
Nurhayati, Wirawati CU and Putri DD. (2015). Penggunaan Produk Fermentasi Dan Kunyit Dalam Pakan Terhadap Performan Ayam Pedaging Dan Income Over Feed and Chick Cost. Zootec, 35(2), 379. DOI: https://doi.org/10.35792/zot.35.2.2015.9457
Palupi R., Lubis FNL and Pratama ANT. (2022). The effect of the use of cassava tuber (Manihot esculenta) and Indigofera zollingeriana leaf flour combination as a source of energy supplemented with citric acid in ration on broiler small intestine characteristics and productivity. Journal of Advanced Veterinary and Animal Research, 9(3): 471–480. DOI: https://doi.org/10.5455/javar.2022.i616
Pradikta RW, Sjofjan O and Djunaidi IH. (2018). Evaluasi penambahan probiotik (Lactobacillus sp) cair dan padat dalam pakan terhadap penampilan produksi ayam petelur. Jurnal Ilmu-Ilmu Peternakan, *28*(3): 203. DOI: https://doi.org/10.21776/ub.jiip.2018.028.03.03
Rodríguez-Lecompte JC, Brady J, Camelo-Jaimes G, Sharif S, Crow G, Ramirez-Yanez G, Guenter W and House JD. (2010). Intestinal characterization of avian defensins and cytokines after the early administration of probiotic with organic acids in broilers. Avian Immunology Research Group. Budapest, Hungary.
Romero JJ, Zhao Y, Balseca-Paredes MA, Tiezzi F, Gutierrez-Rodriguez E and Castillo MS. (2017). Laboratory silo type and inoculation effects on nutritional composition, fermentation, and bacterial and fungal communities of oat silage. Journal of Dairy Science, 100(3): 1812–1828. DOI: https://doi.org/10.3168/jds.2016-11642
Singh M, Lim AJ, Muir WI and Groves PJ. (2021). Comparison of performance and carcass composition of a novel slow-growing crossbred broiler with fast-growing broiler for chicken meat in Australia. Poultry Science, 100(3): 100966 . DOI: https://doi.org/10.1016/j.psj.2020.12.063
Singracha P, Niamsiri N, Visessanguan W, Lertsiri S and Assavanig A. (2017). Application of lactic acid bacteria and yeasts as starter cultures for reduced-salt soy sauce (moromi) fermentation. LWT - Food Science and Technology, 78: 181–188. DOI: https://doi.org/10.1016/j.lwt.2016.12.019
Steel RGD and Torrie JH. (1980). Principles and Procedures of Statistics. McGraw-Hill Inc., New York.
Sugiharto S. (2019). A review on fungal fermented cassava pulp as a cheap alternative feedstuff in poultry ration. Journal of World's Poultry Research, 9(1), 1–6. DOI: https://doi.org/10.36380/jwpr.2019.0
Torrey S, Mohammadigheisar M, Santos M, Rothschild D, Dawson LC, Liu Z, Kiarie EG, Edwards AM, Mandell I, Karrow N, Tulpan D and Widowski TM. (2021). In pursuit of a better broiler: growth, efficiency, and mortality of 16 strains of broiler chickens. Poultry Science, 100(3):100955. DOI: https://doi.org/10.1016/j.psj.2020.12.052
Uguru J, Amah U, Umoren E, Unigwe C, Obinna-Echem, P, Onainor E, Torhemen M and Ucheji C. (2022). Carcass traits, nutrient composition and sensory properties of broiler chickens fed diets containing graded levels of fermented cassava. Nigerian Journal of Animal Production, 49(1), 268–283.
Uzer F, Iriyanti N and Roesdiyanto R. (2013). The Use of Functional Feed In Rations on Consumtion and Body Weight Gain Broiler. Jurnal Ilmiah Peternakan, 1(1), 282–288.
Widodo AR, Setiawan H and Indreswari SR. (2013). Kecernaan Nutrien dan Performan Puyuh (Coturnix coturnix japonica) Jantan yang Diberi Ampas Tahu Fermentasi dalam Ransum. Tropical Animal Husbandry, 2(1), 51–57.
Wikanatsiri, Utama CS and Suyanto A. (2012). Aplikasi Proses Fermentasi Kulit Singkong Menggunakan Stater Asal Limbah Kubis dan Sawi pada Pembuatan

Pakan Ternak Berpotensi Probiotik. Seminar Hasil Penelitian LPPM Universitas Muhammadiyah, Semarang 281–288.

Zhang X, Roland DA, Mcdaniel GR and Rao SK. (1999). Effect of natuphos® phytase supplementation to feed on performance and ileal digestibility of protein and amino acids of broilers. Poultry Science, 78(11), 1567–1572. DOI: https://doi.org/10.1093/ps/78.11.1567

Zulfan and Zulfikar. (2020). Performances of Broilers Fed the Commercial Diet Partly Substituted by Fermented Feed Based onthe Mixing of Corn, Rice Bran, and Leubim Fish (Canthidermis maculata) Processing By-Product Meal. Jurnal Ilmiah Ilmu-Ilmu Peternakan, 23(12), 92–103.

9. Bukti konfirmasi artikel accepted



editor jwpr <editorjwpr@gmail.com>
To: palupi Arda

Mon, Feb 13 at 3:14 PM

Dear Respected Author,

Thank you for your collaboration in making the paper ready for publishing in JWPR. There are some comments that still need your revision.
Kindly find the final edition of your paper encoded JWPR 1285, the acceptance letter, and the invoice (280 USD + bank transfer charge containing the charges of your bank & destination bank). Please revise the paper very carefully based on marginal comments, and track revisions directly on the attached file which is the last version of your paper then send back the full revised manuscript and the receipt of payment as soon as possible to continue the final process. The revisions should be highlighted in a different color.

Best regards

Show original message

--
With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

News: *The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.*

Download all attachments as a zip file

JWPR#185 ES.doc 382kB

Acceptance ... .pdf 291.8kB

Invoice.pdf 183.5kB

Scienceline Pub.
www.science-line.com

Journal of World's Poultry Research
ISSN 2322-455X
www.jwpr.science-line.com

Date: February 13, 2023

PAPER ACCEPTANCE CERTIFICATE

To:

Rizki Palupi*, Fitri Nova Liya Lubis, Anggriawan Naidilah Tetra Pratama, and Muhakka

Department of Technology and Livestock Industry, Faculty of Agricultural, Sriwijaya University, Indralaya, South Sumatera, Indonesia

* Corresponding author's Email: palupiarda@yahoo.com

We are pleased to inform you that your manuscript **JWPR #185** entitled **"Effects of Lactobacillus-fermented Feed on Production Performance and Carcass Quality of Broiler Chickens"** has been primarily accepted for publication in the Journal of World's Poultry Research. The article is required to follow all the necessary steps before its publication in JWPR.

Thank you for submitting your manuscript to JWPR. Should you have any questions, please contact us.

Sincerely,
Daryoush Babazadeh DVM, DVSc, PhD of Poultry Diseases
Editor-in-Chief
Journal of World's Poultry Research (JWPR)
www.jwpr.science-line.com

10. Bukti konfirmasi artikel published online (4 April 2023)

Journal of World's Poultry Research: March Issue Release Updates

From: editor jwpr (editorjwpr@gmail.com)

Bcc: palupiarda@yahoo.com

Date: Tuesday, April 4, 2023 at 12:00 PM GMT+7

Dear Respected Author,

I am pleased to inform you that the Journal of World's Poultry Research has
successfully released the March issue (Volume 13 Issue 1), which can be viewed at the link below.

https://jwpr.science-line.com/index.php?option=com_content&view=article&id=71&Itemid=82

You can easily download your article and upload it to your profile on Researchgate, Academia, or ORCID pages.

Hope to have your precious works in the future.

With Kind Regards,
Dr. Daryoush Babazadeh, DVM, DVSc, PhD
Editor in Chief
Journal of World's Poultry Research (JWPR)
WhatsApp No: + 98 9153240536
Skype ID: drdaryoushb
Tel: + 98 9153240536 (Iran)
Website, Linkedin, Publons, Instagram, Facebook, Twitter

***News:** The updated CiteScore, SNIP, and SJR of Journal of World's Poultry Research are available on the Scopus website.*