

WATER BUFFALO MILK USE IN THE PHILIPPINES

Dari: USEP Publication (publication@usep.edu.ph)

Kepada: yazid_ppmal@yahoo.com

Tanggal: Rabu, 19 Mei 2021 pukul 13.21 GMT+7

Good day, Dr. Yazid,

I am Sajed S. Ingilan, from the Publication Unit of the University of Southeastern Philippines in Davao City and the Editor-in-Chief of the *Southeastern Philippines Journal of Research and Development (SPJRD)*.

The USEP Journal is inviting you to review the manuscript

**Water buffalo milk use
in the Philippines**

The peer review feedback is still due on June 9, 2021.

Please find the attached copy of the manuscript and the peer review/feedback form. Aside from sending back the filled out peer review report, you may also additionally choose to place edited changes to the manuscript (using the Track Changes option) if you so prefer.

Thank you so much for your very kind attention.

Stay safe and more power!

On behalf of the Publication Board,

Sajed S. Ingilan
Editor-in-Chief



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Re: WATER BUFFALO MILK USE IN THE PHILIPPINES

Dari: M Yazid (yazid_ppmal@yahoo.com)

Kepada: publication@usep.edu.ph

Tanggal: Jumat, 2 Juli 2021 pukul 09.27 GMT+7

Dear Dr. Ingilan,

Assalamu'alaikum,

I am pleased to inform you that I have completed the review of the paper. Attached please find the article reviewed using "track change" mode and the filled review form for your consideration.

Thank you for your offer to review this good paper.

Best regards,

Muhammad Yazid

Pada Sabtu, 26 Juni 2021 13.56.15 WIB, USeP Publication <publication@usep.edu.ph> menulis:

Assalamu alaykum, Dr. Yazid.

Alhamdulillah, you are doing well now, Dr. Yazid.

Yes, please, we welcome your review. Jazak Allahu Khayran.

Stay safe always.

Truly yours,

Sajed S. Ingilan

On Sat, Jun 26, 2021 at 2:48 PM M Yazid <yazid_ppmal@yahoo.com> wrote:

Dear Sirs,

Thank you for your email. Unfortunately, I have been infected by Covid-19 at the beginning of June, it took 2 weeks to heal and another 2 weeks to recover. If there is still time for me to review the paper, I will start reviewing next week.

Thank you for your attention.

Muhammad Yazid, Ph.D.

Pada Senin, 21 Juni 2021 10.57.26 WIB, USeP Publication <publication@usep.edu.ph> menulis:

Dear Dr. Yazid:

I hope you are having an awesome week.

We would like to ask for updates regarding the peer review report of the paper titled "Water buffalo milk use in

Water buffalo milk use in the Philippines

ABSTRACT

In the Philippines, water buffalo (carabao) milk has been used since Spanish colonial period in the 16th century. The milk has been processed to cheese called kesong puti or candy called pastillas. These customs are found in limited areas of the country. However, since 1996, Philippine Carabao Center (PCC) launched and new milk use has been practiced using murrah (buffalo) which produce much milk than carabao. Although water buffalo milk was classically used to support the subsistence of special farmers, recently government conducted projects such as loaning carabao for poor farmers, artificial insemination to enhance carabao milk producing ability, and producing new milk products. Philippine has nurtured the water buffalo milk use as a regional culture. However, it is turning to be a national project to shift classical milk use to new milk use which relies on buffalo milk consistently to improve the subsistence of farmers. Dairy farming is drastically introduced by PCC and farming system would change from unreliable rice farming easily damaged by natural disasters to buffalo-oriented dairy farming to stabilize the economic life of dairy farmers. This paper investigates firstly classical milk use found in limited areas of the nation succeeding from long ago, secondly nationwide new milk use which started in 1996, thirdly transition of milk use based on government policy. Finally, this paper concludes that dairy farming is becoming popular in farming societies where PCC located and dairy culture become major industrial farming system from minor regional system to sustain the lives of local farmers.

Keywords: water buffaloes, milk products, milk use, dairy transition, the Philippines

Introduction

Southeast Asia countries, including the Philippines, is regarded as a "non-milk use cultural sphere" where milking of animals and milk use have not historically been conducted (Simoons, 1973, p. 606). While the clear reason why milk use has not developed is unknown, several theories are conceivable. First of all, 90% of the people in Southeast Asia are lactose intolerant, with their ingestion of milk resulting in symptoms such as diarrhea (Adachi, 1998, p. 150). Repulsive feelings triggered by the taste and smell of milk experienced by people in Southeast Asia can also be confirmed (Tsuji, 2016, p. 134; Tsuji et al., 2021, p. 346). Taking the climate of Southeast Asia as an influential factor, it is thought that the amount of rainfall and the richness of fruit in the region has supplied locals with moisture as an abundant resource; this is not an environment in which milk is required for additional moisture. In addition, when animals in the region were sacrificed, their meat was used rather than their milk (Junker, 2000, p. 329). In addition, attitudes towards milk processing as conducted by colonists in Southeast Asia may be a factor that contributes to the lack of milking in the region. It is also reported that the number of water buffaloes has decreased because of an increase in imported cattle (Doeppers, 2016, p. 276). Although additional theories exist, we can conclude that the issue can be attributed to multiple factors.

Despite these claims about the lack of milk use in Southeast Asia, in this paper, we show that milk is in fact used in the region, by examining the case of the Philippines. In the country, water buffaloes, cattle, and goats are all used for milk production, but this paper focuses on the use of water buffalo milk.

In Southeast Asia, water buffalo milk is consumed in both the Philippines and Indonesia (Tsuji, 2019a, p. 15, 2020b, p. 1; Tsuji et al., 2021, p. 339). In the Philippines, cheese called kesong puti and milk candy called pastillas are created using water buffalo milk, while in Indonesia cheese such as danke and litsusu, and yoghurt such as dadih are also processed (Kozaki et al., 2001, p. 212). Both countries have experienced colonial rule from Spain and the Netherlands, respectively, and it seems that these dairy products were introduced into the Philippines and Indonesia during the periods of colonialism.

Spanish colonial rule in the Philippines began in the 16th century. According to historical records, Spaniards and Chinese in the Visayas area were milking water buffaloes and processing cheese at that time (Alcina, 2004, pp. 35–37).

In the Philippines today, the classical use of buffalo milk exists in Bulacan, Laguna, Cavite, Cebu, Samar, and Leyte provinces (Aquino et al., 2011, p. 195; Tsuji, 2020a, p. 171).

It is unclear why only 6 out of the 81 provinces in the Philippines use milk; one hypothesis is that Spanish governance, including the use of milk, did not reach every corner of the country. However, historical materials that support this fact have not been identified. The nationwide population increase due to colonization may have reduced the land available for buffalo pasture. In addition, peddlers sold buffalo milk in Manila during the 19th and 20th centuries, but since then milk sales have gradually decreased because of contamination problems (Doeppers, 2016, p. 269).¹ These reasons may contribute to the fact that milk is produced only locally today.

The classical use of water buffalo milk has been upheld by a network of buffalo milk producers, household processing companies, and peddlers (Tsuji, 2021a, p. 53). Additionally, at the national level, the Philippine Carabao Center (PCC) was opened in 12 provinces in 1996, to popularize buffalo milk use. The use of buffalo milk in the Philippines is currently a mix of both classical and new milk uses (Tsuji, 2019b, p. 130).

This paper provides an outline of the common uses of water buffalo milk in the Philippines, including classical and new milk use, and clarifies the current situation of water buffalo milk use in the Philippines.

Methods

Research in Philippines was conducted in Bulacan Province, Laguna Province, Cavite Province, Cebu Province, and Samar Province. Including Leyte Province, water buffalo (carabao) milk use is actively practiced in these areas (Aquino et al., 2011, p. 195). Fresh cheese called kesong puti and a candy called pastillas are mainly processed in the areas. The research was conducted from April 5, 2016 to August 20, 2019 (15 times).

Research methods are observation, questionnaire, interview and measurement. Tagalog is used for the research language.

The currency rate in this paper is on the time of September 9, 2019.

General use of water buffalo

Water buffaloes are primarily used in the Philippines for towing and transporting livestock. In fields and paddies, water buffaloes are used for tillage and serve as an important source of power (labor?) for farmers. They are also often used to transport people and loads, especially in areas where tractors and automobiles are not widespread. However, because of the "Green Revolution" that began in 1976, many water buffaloes have been replaced by

¹ Milk pollution occurred across the world at the same time (Velten, 2014, p. 82).

tractors, and a large number of buffaloes have been slaughtered.² In addition, in some areas water buffaloes are used for entertainment purposes, such as racing and bullfighting (FAO, 1977, p. 210). Several unique festivals involving water buffaloes exist in various parts of the Philippines, and races and bullfighting are also conducted during such festivals (PCC, 2012, pp. 24–33)³. These activities are said to have been introduced with the arrival of the Malay people in the Philippines (The Society for Researches on Native Livestock, 2009, p. 167) although the Philippine water buffalo was shown to have been introduced from Southern China through DNA research (The Society for Researches on Native Livestock, 2009, p. 178).

Water buffalo is also part of the "livestock trust" system alongside cattle, goats, pigs, chicken, and other livestock. Livestock trust is a practice that allows a livestock owner to delegate the care of livestock to a caretaker who is acquainted with the owner. The caretaker then receives calves born from the livestock as interest (Tsuji, 2011, p. 53, 2013, pp. 98–99, 2019c, p. 27).⁵ Water buffalo caretakers are eager to provide the buffalo with pastures with the expectation that calves will be born; meanwhile, this allows the owner of the buffalo to avoid the trouble of taking care of the livestock himself. Water buffaloes used in the livestock trust system are preferably female, but males are also taken care of as stud bulls.

Water buffaloes are slaughtered at ceremonial occasions such as weddings, especially in Islamic and indigenous communities. The bride's family may provide the groom's family with a water buffalo as dowry.

Locals of some areas in the country also use the skulls of water buffaloes that have been slaughtered in rituals to decorate their residences as a symbol of their prosperity.

Water buffalo meat, called carabeef, is the preferred low-cost, low-cholesterol food compared to beef or pork.

As mentioned above, water buffaloes have been used in the Philippines for economic purposes, rituals, food, and many others – but not historically for their milk.

Classical milk use

² The actual number of buffaloes slaughtered during the green revolution has not been made clear.

³ Water buffalo festivals in various parts of the Philippines are presumed to be relatively new, dating to 1993 when the PCC was established.

⁵ In fact, there are various arrangements between livestock owners and livestock caretakers.

People in the Philippines have, however, milked water buffalo in recent history, making a living by processing the milk into cheese or pastillas. The history of such practices most likely dates to the period of the Spanish rule. It is not clear why Filipinos have continued producing water buffalo milk until today. This may be because they realized that water buffaloes can be used not only for agricultural purposes but also to produce milk, and because they form a part of the country's livelihood. Today, the consumption of water buffalo milk is practiced by a very small number of people within a limited area. The use of water buffalo milk is an unusual industrial culture.

Classic buffalo milk use involves milking native water buffalo and processing their milk into cheese or pastillas. Water buffaloes are not raised in densely populated areas and, instead, tend to be raised in areas with low populations, such as mountainous regions with meadows on which buffaloes can graze. Livelihood cannot be established solely through buffalo breeding; therefore, people combine agriculture and livestock breeding. Moreover, only about one liter of milk can be produced per day from the native water buffaloes; hence, it is necessary to possess multiple milkable female water buffaloes to make sufficient milk sales to survive on. Milking is done early in the morning, between 4 and 8 AM. Water buffaloes are tied to trees and milked. Milking may be assisted by women, but men seem to be the primary practitioners.

When enough milk is produced, the worker carries the milk to a milk processing factory or broker. Milk producers rarely process milk; instead, they sell it to milk processors. This is may be because of their need for cash income. In addition, the processor is able to avoid the trouble of producing milk. While the price of milk varies, it is typically about 100 pesos (about 1.87 USD) per liter or about 35 pesos per 350 milliliters.

Processors are domestic processors or general housewives, but they are known as milk processors in their areas. There are many women who process milk, but men can also perform the task.

Water buffalo milk is often processed into milky, fresh cheese that does not mature. This cheese can be called kesong puti, keso, kesiyo, keseo, kasilyo, etc. – all of which take the Spanish word queso as their origin. The manufacturing method differs somewhat between cheese types, but all are sold for 20-30 pesos per piece. The processing methods for a selection of water buffalo cheeses are discussed below.

Kesiyo (from Cebu province) is created by first heating water buffalo milk to 72 °C, using palm vinegar as a starter. The milk is coagulated in the pan, and when the curds are shaped to moderate size, the cheese is seasoned with salt, and the water is dehydrated. The

cheese is then wrapped in banana leaves to complete the process. Rennet is seldom used. Rennet is used in Laguna and Cebu provinces, and vinegar is used in Bulacan and Cavite provinces (Kozaki et al. 2001, p. 212) although the practices in Samar and Leyte provinces are unknown. In Laguna province, the rennet is called bahay asim, while in Cebu province it is called kuajo. Kasilyo (from Cavite province) and keso (from Samar province) seems to follow the same recipe. These cheeses are sold in local neighborhoods (Tsuji, 2017a, pp. 60–61, 2017c, p. 13, 2017d, p. 21).

Keso (from Cebu province) does not use heated milk; instead, milk is placed in a pitcher or similar container, mixed with palm vinegar starter and salt, and stirred. When the curd develops, it is wrapped in gauze, pressure is applied with a stone, and the whey is dehydrated. The whey is then discarded and the cheese is wrapped in banana leaves to complete the process. Rennet is seldom used. The cheese is sold in local neighborhoods (Tsuji, 2017 a, pp. 60–61, 2017 b, p. 9, 2017d, p. 21).

Kesong puti (from Laguna province) does not involve heating the milk. Milk is placed in a container and is stirred with the starter, salt, and coconut vinegar. When the curd forms, it is filtered with a wire mesh and the whey is discarded. Curds are placed in bamboo leaves and processed. The use of rennet is acceptable, but it is rarely used because it is not easy to obtain in local markets. Two or four curds are then wrapped with banana leaves and reinforced with betel palm (*Areca catechu*) bark and tied with a string. It is thought that cheese in this area is peddled carefully, with such reinforcements, so that it is not damaged at all (Tsuji, 2018a, p. 13, 2019d, p. 29).

In Laguna province there is a cheese peddler who buys cheese produced at home manufacturing and sells it to other customers. This peddler mainly sells cheese around the Lake Laguna area, but sometimes extends his journey to Manila. The peddler buys cheese from the producer at 10 pesos per piece and resells it at 30 pesos. The peddlers sell 40 to 80 cheeses over 10 hours a day (Tsuji, 2018a, p. 15). Peddling is a laborious task and water buffalo cheese does not circulate frequently enough to peddlers ... what does this phrase mean?; and when cheese cannot be obtained, it puts peddlers in an unstable position that forces them to sell another product. For example, in Laguna, peddlers sell salted eggs (itlog na pula), boiled coconut milk with lake shrimp (alamias), and confectionery made from coconut milk processed with glutinous rice or cassava (espasol and suman) as cheese substitutes (Tsuji, 2018a, p. 11).

In Bulacan province, pastillas are produced using water buffalo milk in addition to cheese. Pastillas are candies derived from Spain that are typically sweetened with condensed

milk, but here, the candy is processed using boiled water buffalo milk and sugar.⁶ Bulacan and Leyte provinces are famous for the water buffalo milk pastillas; the high concentration of water buffaloes here may have made it easy for Spaniards to develop a dietary culture using water buffalo milk. As this province is also a major producer of sugar, the abundance of both milk and sugar may have produced the candy. In this way, pastillas would have been accepted by Filipinos seeking a sweet treat.

Pastillas are produced by adding sugar to water buffalo milk and boiling the mixture down until it becomes pasty on a classical cooking stove. Then solidified pastillas are cut into appropriate quantities, covered with sugar, and wrapped in paper. Boxes containing 25 pieces of *pastillas* are sold for about 130 pesos. Processing is carried out in at-home manufacturing locations and the candies are sold at souvenir shops as well as in shops dedicated to the sale of *pastillas*. *Pastillas* sell is especially well during Christmas and Holy Week (Tsuji, 2018b, p.28, 2019e, p. 8).

As mentioned above, classical water buffalo milk use has a minor but established position as a food culture for the production of cheese and pastillas in the Philippines.

New milk use

In the Philippines, water buffalo milk has been consumed since the 16th century by limited individuals living in limited areas. While classical water buffalo milk use culture may be difficult to spot in everyday life across the country, the use of water buffalo milk is prevalent today at the national level.

In the literature from the 16 to 17 centuries, there are very few descriptions of the use of water buffalo milk in the Philippines (Alcina, 2004, pp. 35–37; Morga, 1966, p. 315), but after the 20th century the interest in the subject has increased.

Negative experiences exist in the Philippines related to water buffaloes such as the loss of buffalo to rinderpest early in the 20th century, the massacre of the animals by the Japanese military in the mid-20th century (Roque, 2011, p. 6), the mass slaughter of water buffalo during the "Green Revolution," and a dependence on foreign milk such that 99.9% of milk consumed in the country is imported. The emergence of an elevated nationalism may be related to recent attempts in the country to produce milk domestically by using the water buffalo, which is a national symbol (Tsuji et al., 2017, p. 106).

⁶ Pastillas, also called pastillas de leche, have a milky taste (de leche), but also have ubi flavors (*Dioscorea alata*) and yema flavors (egg yolk).

If it is simply an increase in the amount of milk produced by the Philippines that is expected, Holstein or Jersey cattle should be used instead of water buffalo. This leads us to question why the PCC is working to increase the milk yield of water buffalo. The answer may be related not only to the above-mentioned negative history and nationalism but also to the pursuit of improving the livelihoods of farmers and promoting public health.

Broadly, the new use of water buffalo in the Philippines began in 1996 – only 25 years ago at the time of writing. In 1996, the PCC was established as a national policy in 14 areas in Luzon, Visayas, and Mindanao islands. The mission of the center is to improve the livelihoods of farmers rearing water buffalo, to improve the health of the people, to improve and preserve water buffalo genes, and to pursue the utility value of these animals.⁷

The PCC aims to improve livelihood by loaning water buffalo to farmers and engaging in milking. Farmers are obliged to receive certain training as conditions upon receiving the water buffaloes. The water buffaloes loaned by the Center are river-type buffaloes such as murrachs, rather than swamp-type buffaloes like carabao, but hybrids are also loaned. Backcrossing is done until the 4th generation. From the 4th generation it is considered a cow for dairy (PCC, 2009, p. 7). The murrach has a milk yield of about five liters per day, equivalent to five times that of the native. Murrachs imported from Bulgaria, Brazil, America, Italia and India are used. When murrach or hybrids birth calves, farmers give them to the center to repay their loans (Tsuji, 2017a, p. 59). State the specific characteristics that differentiate murrachs from carabao, besides they are imported!

The center buys milk from the farmers, processes it, sells it in stores and cafes directly under the center, and ships it to big cities like Manila. The price of milk varies from center to center, but it is typically around 60 pesos per liter. The price of milk is on an increasing trend year by year. Farmers also engage in processing, agricultural cooperatives are organized, and farmers are integrated.

The dairy products processed by the center are diverse and include raw milk, yogurt, ice cream, pizza, confectionery, and soap in addition to classical products such as cheese and pastillas; the center strives to disseminate water buffalo dairy products. Many tourists visit the shops and cafes directly under the center to buy dairy products.

Murrachs' lactation periods are 305 days per year (Borghese, 2005, p. 2). Farmers milk water buffalo every morning at their homes and deliver milk to the center or cooperative, **but hardly ever drink the milk they produce**. By selling milk, they receive a cash income with

⁷ The Dairy Training Research Institute (DTRI) of the University of the Philippines at Los Baños is also developing similar attempts.

which they can improve their lives by being able to pay their children's educational expenses and business funds and purchase automobiles and motorbikes. **The fact that the milk producer does not drink milk raises health concerns** (Tsuji et al., 2018a, p. 4, 2018b, p. 41). State the reasons why this happened!

However, farmers who are able to borrow buffalo on loan are with a certain economic margin to some extent; it seems to be difficult for poor farmers, such as tenant farmers, to borrow buffaloes to produce milk. However, the PCC prioritized the poor, giving milk buffaloes to poor farmers,⁸ so the number of farmers who make their livings by milking buffaloes may increase in the future.

In addition, the center provides buffalo milk to poorly malnourished children and promotes the health of locals. Water buffalo milk surpasses cow's milk in its energy, protein, fat, calcium, phosphorus, retinol, and vitamin A content (Chinte-Sanchez, 2008, pp. 237–238), making it a good source of nutrients.

Regarding the improvement and conservation of water buffalo genes, it seems that the milking of water buffaloes is being promoted alongside the preservation of the genes of native. The laboratory is trying to steer the use of water buffaloes from conventional uses in agriculture and transportation towards uses for milk, indicating that the future uses of water buffaloes may change significantly.

While the improvement in the utility value of water buffaloes is a task for the future, various festivals and events related to the animals have been held in various parts of the Philippines since the establishment of the PCC. The dissemination of activities related to water buffalo and their milk is steadily progressing.

Conclusion: The buffalo milk in the future

This paper has shown the general situation of water buffalo use in the Philippines, classical milk use, and the new milk use situation.

The Philippines, along with Indonesia, shows an unusual use of water buffalo for the typically non-milking cultural areas of Southeast Asia. Although this may be a product of colonialism, it is a serious element that greatly differs from the usage patterns of other Southeast Asian countries with water buffaloes.

⁸ For example, the 4 Ps (Pantawid Pamilyang Pilipino Program) is a worldwide effort to improve the health and education of the poorest 0-14-year-old children.

However, Filipinos tend not to like milk, instead feeling repulsed by it as well as being lactose intolerant. Therefore, in the Philippines, a milk-drinking culture has not developed, instead milk use has survived by converting lactose to cheese or *pastillas*.

In recent years, opportunities to ingest raw milk, yogurt, and other products are increasing as a result of heightened general health consciousness, but the use of water buffalo milk is still too costly to be popularized with the public as a whole. Buffalo milk cheese and *pastillas* are luxury goods; water buffaloes are still mainly used for agriculture and transportation. It will take time for many people to become familiar with new usages of water buffalo, though these uses are part of an underlying culture.

However, classical water buffalo milk use is currently undergoing dramatic changes. The *murrah* will become popular in the production of milk, and in the future, the *murrah* may become the center of milk use rather than the *carabao* (Tsuji, 2021, p. 159).

Crossbreeding the *carabao* and *murrah* increases the production of milk and may therefore increase distribution volume. If so, the relationship between buffalo milk and Philippine people will become much deeper.

The PCC is determined to improve the social economy and citizens' health through water buffalo milk. In that case, classical milk use will also be swallowed by new uses, and conflicts may arise between old and new milk usage styles (Tsuji, in press).

New milk use is profit-centered. However, many farmers seek cash income and to compensate for the slump in agriculture. If *murrah* with high milk yields were introduced everywhere, people may overwork the water buffalo to produce as much milk as possible; this is an important issue from an animal welfare perspective.

Also, although new milk production seems to be doing well currently, there is no guarantee that the price of milk will continue to rise in the future. If milk prices drop, farmers' lives will be severely affected.

If the farmers are leveled out, the worst scenario would involve the value of milk dropping, price cuts occurring, and the quality of milk subsequently declining. In addition, the return of rinderpest must be considered a possibility.

The rising popularity of water buffalo milk may be part of an era in which unusual products are thriving. The PCC encourages the use of water buffalo milk by farmers and guides them in milking, but what does the future hold? Optimistic people will see a bright future, but it is uncertain whether daily life will be able to be supported through dairy farming only. People are keeping livestock, taking side jobs, and diversifying risk, but is it possible to respond to crises that cannot be predicted?

The development of buffalo milk use culture is desirable and has the potential to benefit the socio-economic status and health of people in the Philippines. However, it is vital to develop a solid vision for the PCC so that people engaging in this industry will not be misled. Tradition is also important, and new and old milk uses should be developed to coexist without creating competition.

Acknowledgement

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Several milking farmers and milk processors helped this research work. Staffs of Philippine Carabao Center and Department of Agriculture also supported the work.

I deeply express my gratitude for the foundations, institutions and people mentioned above.

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Certificate of Appreciation

is given to

Dr. Muhammad Yazid

Sriwijaya University, Indonesia

for sharing his time and expertise as

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A handwritten signature in blue ink, appearing to read 'Sajed S. Ingilan', is positioned above the printed name.

SAJED S. INGILAN
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