es ($p<0.05$). Percentage deficiency of P, Mg and S in eason was 71.4, 28.6 and 14.3%; while in dry season iency of P and S was 85.7 and 42.9%, respectively. Within same species of forage, variability of mineral concentration ither in dry or rainy season was higher in grass than in legumes. Concentration of Ca and P in the present study was higher in dry season than in rainy season. Although this finding was opposite with the result of Underwood and Suttle [3], Minson [7] suggested that at the fast growing period of plants during rainy season, concentrations of Ca and P tend to be lower and then increase at the slow growing period during dry season. Moreover, leaching of the top soil organic material during rainy season will reduce uptake of minerals by plants.

As shown in Table 3, harvesting location and season had no significant effect on concentration of blood macro minerals in grazing goats. Although the average concentrations of Ca, P, Mg and S both in dry and rainy seasons were above the critical level, several goats observed were deficient of these elements. In overall, the incidence of Ca, P and Mg deficiencies were 4.6, 7.7 and 5.7%, respectively. The percentage deficiency of these elements in the present study were lower compared to the results of Prabowo *et al.* [4]. In their study on grazing cattle in South Sulawesi, the deficiency percentages during rainy and dry season were: Ca 11 and 10%, P 17 and 23% and Mg 13.3 and 2.0%, respectively.

Table 3. Concentration of macro mineral in blood plasma of goats at several regions in West Sumatra during rainy and dry seasons (mg/l).

Region	Season	Ca	P	Mg	S
Critical level :	—	70	40	15	10
Padang	Rainy (30)	100.8±1.9	75.1±2.8	23.5±0.6	90.4±0.4
	Dry (41)	89.5±1.8	71.9±1.9	22.5±0.7	83.4±2.0
Pariaman	Rainy (15)	96.7±1.7	79.7±2.8	24.0±0.6	93.0±2.5
	Dry (25)	83.4±1.3	76.3±2.1	23.1±0.4	93.7±2.7
Solok	Rainy (14)	88.4±3.1	57.8±3.0	26.3±1.4	88.9±4.0
	Dry (12)	96.0±3.2	71.8±4.4	26.3±1.9	79.0±2.6
Sawahlunto	Rainy (28)	96.9±1.0	66.3±1.6	26.7±0.4	91.3±1.3
	Dry (27)	88.1±0.8	61.2±1.1	22.1±0.3	89.1±1.2
Tanah Datar	Rainy (33)	97.5±2.9	81.1±2.2	25.9±0.8	81.4±1.8
	Dry (36)	95.4±3.0	76.4±2.0	24.8 + 0.8	81.1±1.7
Mean:	Rainy	93.3±2.1	71.8±2.4	24.5±1.1	89.0±2.0
	Dry	96.1±2.1	72.0±2.5	25.3±0.8	85.3±2.0
	Overall	90.5±2.0	71.5±2.3	23.8±0.8	87.1±2.0
Deficiency (%)	--	4.6	7.7	5.7	0.0

Conclusions

From the above results, it could be concluded that Ca was the most abundant element, while P, Mg and S were relatively low in the forages harvested in West Sumatra, Indonesia. The incidence of Ca, P and Mg deficiencies in grazing goats were 4.6, 7.7 and 5.7%, respectively.

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