Balanced Feeding Could Improve Productivity of Cross-breed Dairy Cattle in Smallholder Systems (Tigray, Northern Ethiopia)

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Introduction

Dairy farming sector has significant contribution in terms of poverty alleviation in Ethiopia by increasing the income of smallholder dairy producers and creating employment opportunities. However, the low productivity of dairy sector in in the country is constrained by many factors. Among the limitations, inadequate nutrition is known to be one of the major constraints for lower milk production of cows.

Balanced nutrition contributes to improving animal output as well as reducing cost of production. Therefore , this study was conducted to assess the feed baskets of lactating Holstein Friesian crossbred cows and to formulate suggestions for optimisation of the ration to balance crude protein(CP) and metabolisable energy (ME) supply for optimal milk production under smallholder dairy farming in Agula and Hagereselam districts of Tigray region, northern Ethiopia.

Materials and methods

A total of 60 smallholder dairy farmers (30 from each district) who owned 1–5 lactating cows were involved in the study during the months of July and August 2015. Daily feed intake and milk production were recorded.

The observed diets offered to early lactating cows (≤120 days postpartum) of both study sites were grouped into five categories based on the inclusion rate of wheat and barley straw mix (WBSM), wheat bran (WB), noug seed cake (NSC) and atella (local brewery by-product).Out of 60 dairy farms, six farms were not categorised in the five ration groups (Table 1) due to a total lack of utilisation of one of the major feeds and inconsistent pattern of their feeding regimes.

Weende and Van Soest analysis was done on representative feed samples from which ME content was assessed. The average weight of the cows was taken as 550 kg, producing milk with 4% fat at a daily dry matter intake(DMI) of 2.5% body weight. The ME plus CP requirements for maintenance and milk production depending on fat content of the milk was computed accordingly Lee *et al.* (1998).

Table 1. Ration composition for lactating cows in Hagereselam and Agula districts of Tigray region

	GROUP (% of feed in daily ration ± SD)				
Type of feed	1 (n = 14)[a]	2 (n = 8)[b]	3 (n = 11)[c]	4 (n = 11)[d]	5 (n = 10)[e]
WBSM	60.4 ± 2.2	49.8 ± 5.3	53.5 ± 3.5	40.7 ± 3.6	50.5 ± 7.5
WB	30.8 ± 2.9	21.8 ± 2.4	24.5 ± 3.3	24.0 ± 3.2	26.7 ± 3.6
NSC		17.5 ± 2.1	13.3 ± 0.6	13.1 ± 1.2	8.2 ± 2.2
Atella	8.7 ± 1.8	10.8 ± 5.4	8.7 ± 2.0	22.2 ± 3.9	14.7 ± 5.7

[a] *– 12 farms in Hagereselam, 2 farms in Agula,* [b] *– 5 farms in Hagereselam, 3 farms in Agula*
[c] *– 7 farms in Hagereselam, 4 farms in Agula,* [d] *– 1 farm in Hagereselam, 10 farms in Agula*
[e] *– 4 farms in Hagereselam and 6 farms in Agula*

Results

1. Milk production potential from crude protein and metabolizable energy supply of observed rations

Table 2. Potential milk production based on estimated dietary metabolisable energy and crude protein supply from the observed rations

Group	CP supply for milk production (kg CP/day)	ME supply for milk production (MJ/day)	Milk production/day		Production efficiency (kg milk/kg DMI)	Feed cost/litre (EUR)
			ME basis (kg milk/day)	CP basis (kg milk/day)		
1	0.6	59.3	11.2	7.0	0.5	0.21
2	1.4	68.9	13.0	16.9	1.0	0.14
3	1.2	66.4	12.5	14.6	0.9	0.14
4	1.4	69.9	13.2	16.6	1.0	0.14
5	1.1	65.3	12.3	12.5	0.9	0.13

Protein and ME supply only seemed balanced in group 5 (18% of the farms). In the other groups imbalanced diets were fed, of which 26% were protein deficient (group 1), whereas (surprisingly) 56% of the farms included more than 10% NSC in their diet, which resulted in an excessive protein supply.

2. Optimisation of the ration to balance crude protein and metabolisable energy supply for optimal milk production

Table 3. Potential milk yield and the corresponding ration composition for the metabolisable energy–protein balanced rations

Group	% DMI				Milk yield (kg milk/day)	DMI (kg DM)	Feed cost/litre (EUR)
	WBSM	WB	Atella	NSC			
1	54.1	27.6	7.9	10.4	15.0	15.3	0.13
2	55.8	24.4	12.1	7.7	9.5	12.3	0.15
3	56.7	25.9	9.2	8.2	10.7	12.5	0.14
4	44.8	26.4	24.5	4.3	10.2	13.8	0.17
5	50.4	26.7	14.7	8.2	12.4	13.8	0.14

The milk yield of group 1 potentially could be increased by 114% with an additional supplement of 1.6 kg of NSC.

Conclusion

Noug seed cake could be an excellent protein corrector, when included at a proportion of about 10% in the diet in combination with 43–58% WBSM, 23–31%WB and 9–20% atella.

Reference

Lee, S.D, Kennard, R. O. and Kayouli C. (1998). *Manual of Smallholder Milk Production in the South Pacific. FAO.*

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