

Reducing crude protein of calf starter considering different amounts of Methionine and Lysine

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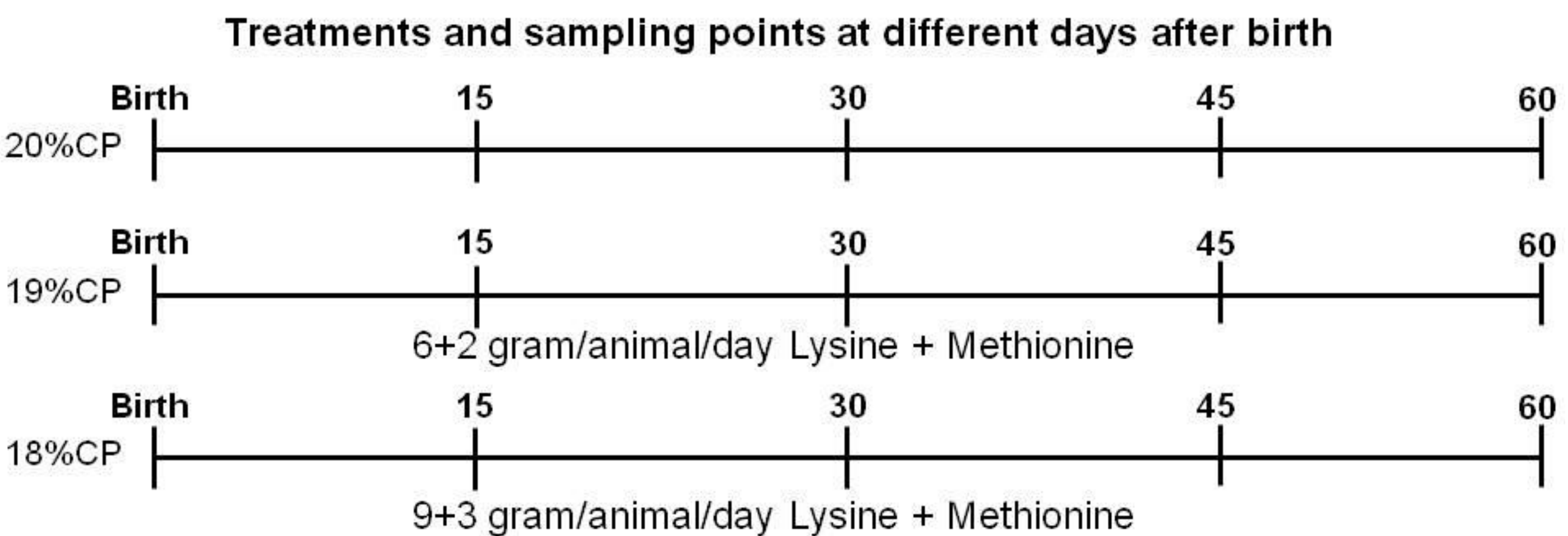


Introduction

In modern animal husbandry using high levels of protein (19-22% CP) in calf starter by adding considerable amounts of high quality protein sources (Soybean meal) is a common practice; previous reports indicated maximum 50% protein digestibility in such a condition. Furthermore, Lysine and Methionine were identified as the first and second limiting amino acids respectively, reducing dietary crude protein in dairy cattle. This reduction has economical and environmental advantages. Differential poisoning levels of Methionine (more than 12 g/animal/day) was observed dependent to N retention in calves. To our knowledge, less information are available about Lysine and Methionine as the feed additives to reduce the dietary crude protein content in calf starter. Therefore, herein we aimed to study the effect of different ratios of Methionine and Lysine on calves DMI intake and growth performance.

Materials and Methods

29 female Holstein calves were allocated to 3 treatments immediately after birth in individual stalls and received calf starter and water ad-libitum. Milk was fed 10 % of body weight after colostrum. Daily dry matter intake, weekly body weight, body length (Point of shoulder to pin bone), heart girth and stomach area (at Loin-Chine connection) were measured. Data were analyzed in a completely randomized design using GLM procedure of SAS 9.2 (P<0.05).



Results

Data showed that none of the traits was affected by 1 or 2 percent reduction in calf starter CP content; all the production traits were in upper level of normal ranges. Calves average growth rate was 630 gram/day up to 60 days of age with a 670 gram/day calf starter intake resulted in feed to gain value of 1.

Table 2 Changes in performance of female calves (Birth to 60 days old) fed starters with different amounts of CP content, Lysine and Methionine

Items	Duration (days after birth)	Treatments					
		18%CP ¹		19%CP ²		20%CP	
		Mean	SE	Mean	SE	Mean	SE
(milk+Feed) to Gain	1 to 30	0.90	0.04	1.27	0.12	1.19	0.13
	30 to 60	1.59	0.07	1.37	0.09	1.52	0.10
	1 to 60	2.18	0.03	2.38	0.25	2.25	0.07
Body length ³ gain (mm)	1 to 30	2.60	0.43	2.19	0.33	1.87	0.29
	30 to 60	3.03	0.32	2.89	0.44	2.37	0.33
	1 to 60	2.82	0.28	2.54	0.23	2.12	0.17
Body weight gain (gram)	1 to 30	453	51	387	41	435	37.80
	30 to 60	820	30	850	87	827	54.90
	1 to 60	637	24	619	58	631	31.62
Daily DMI (gram)	1 to 30	214	31	317	85	327	52.33
	30 to 60	1118	60	997	143	1050	88.22
	1 to 60	666	42	657	108	688	59.05
Feed to gain	1 to 30	0.46	0.04	0.72	0.15	0.74	0.12
	30 to 60	1.37	0.07	1.11	0.12	1.29	0.10
	1 to 60	1.04	0.03	0.99	0.13	1.08	0.06
Heart girth (mm)	1 to 30	2.03	0.27	2.04	0.34	1.93	0.28
	30 to 60	5.03	0.22	4.48	0.46	4.73	0.20
	1 to 60	3.53	0.15	3.26	0.30	3.33	0.20
Stomach area ⁴ (mm)	1 to 30	1.83	0.30	1.26	0.21	1.87	0.17
	30 to 60	2.67	0.31	2.44	0.34	2.23	0.20
	1 to 60	2.25	0.24	1.85	0.16	2.05	0.10

1- 18 % CP + 9 gram/animal/day Lysine + 3 gram/day Methionine

2- 19 % CP + 6 gram/animal/day Lysine + 2 gram/day Methionine

3- Body length: direct distance between point of shoulder to pin bone

4- Area around stomach at loin-chine connection point

- Methionine and Lysine were added surplus to daily milk intake (5 kg/calf/day)

Objectives

- Possibilities to reduce calf starter CP
- Calves respond to reduction in calf starter CP together with addition of Lysine and Methionine

Table 1 Calf starter ingredients and chemical composition of calf starter

Feed ingredients %	Treatments		
	18%CP ¹	19%CP ²	20%CP
Barely grain ,rolled	8.85	8.04	6.19
Corn grain, ground	46.9	45.54	45.13
Cottonseed meal	7.08	7.14	7.08
Soybean meal	18.58	21.43	24.78
Wheat bran	7.96	8.04	7.08
Beet sugar pulp	8.85	8.04	7.96
Sodium bicarbonate	0.9	0.9	0.9
Limestone	0.9	0.9	0.9

Diet chemical composition

CP%	18.0	18.8	20.1
ME Mcal/kg	3.07	3.08	3.09

1- 18 % CP + 9 gram/animal/day Lysine + 3 gram/day Methionine

2- 19 % CP + 6 gram/animal/day Lysine + 2 gram/day Methionine

- Methionine and Lysine were added surplus to daily milk intake (5 kg/calf/day)

Table 3 Performance characteristics of female calves (Birth to 60 days old) fed starters with different amounts of CP content, Lysine and Methionine

Items	Days after birth	Treatments					
		18%CP ¹		19%CP ²		20%CP	
		Mean	SE	Mean	SE	Mean	SE
Body length ³ (cm)	0	67.0	1.44	68.4	1.51	69.3	1.38
	15	69.8	1.32	71.2	1.82	70.7	1.50
	30	74.8	0.85	75.0	1.39	74.9	1.35
	45	79.4	1.32	78.4	1.19	78.2	0.84
	60	83.9	0.84	83.7	1.25	82.0	1.32
Heart girth (cm)	0	76.0	1.56	76.4	1.28	75.3	1.37
	15	78.3	1.25	78.9	1.18	77.5	1.24
	30	82.1	1.25	82.6	1.49	81.1	0.85
	45	89.9	1.21	90.0	1.89	86.3	0.92
	60	97.2	1.24	96.0	1.88	95.3	1.24
Stomach area ⁴ (cm)	0	77.1	1.40	79.8	1.13	77.9	1.04
	15	80.3	1.16	81.9	1.14	80.4	0.88
	30	82.6	0.82	83.6	0.80	83.5	1.08
	45	87.0	1.11	87.2	1.08	85.2	0.84
	60	90.6	1.19	90.9	1.46	90.2	0.99
Body weight (kg)	0	40.8	2.11	41.0	2.13	38.3	1.68
	15	44.4	2.12	44.6	2.26	42.8	2.10
	30	54.4	2.64	52.6	2.70	51.4	2.13
	45	67.5	2.73	65.6	3.11	62.7	2.10
	60	79.0	2.59	78.1	3.84	76.2	2.71

1- 18 % CP + 9 gram/animal/day Lysine + 3 gram/day Methionine

2- 19 % CP + 6 gram/animal/day Lysine + 2 gram/day Methionine

3- Body length: direct distance between point of shoulder to pin bone

4- Area around stomach at loin-chine connection point

- Methionine and Lysine were added surplus to daily milk intake (5 kg/calf/day)

Conclusion

Considering the level of amino acids in calf starter, diet CP content could be reduced from 20 to 18 % without negative effects on calves production traits that economically could be of interest. Further researches are needed to analyze the nutrient digestibility and metabolic parameters of the calves.