



The effect of dietary protein levels on growth performance of female Holstein calves during the post-weaning period

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Abstract

This study was aimed to investigate the effect of different levels of dietary protein on growth of female Holstein calves during the post weaning period. An average of 60 days old 20 female Holstein Friesian calves were used for the experiment. Calves were divided into two groups; while first group received feed containing 18% CP, second group received feed containing 22% CP. The results showed that concentrate fed protein levels were did not affect live weight (LW) of the calves (138.45 vs 157.50 kg). The BM were found 100.65 vs 102.40 cm for body length (BL), 101.45 vs 106.60 cm for wither height (WH), 45.55 vs 45.80 cm for body depth (BD), 106.90 vs 109.20 cm for hip height (HH), 30.85 vs 31.95 cm for hip width (HW) and 115.85 vs 121.55 for chest girth (CG) ($P > 0.05$). The results showed that, better performance has observed in calves fed with %22 CP.

Keywords: Dietary protein level, Female Holstein calves, Post weaning period, Performance

Introduction

The calf feeding programs are required to be developed in early life of heifers. Requirements of protein of ruminants are calculated by ARC (1980) and NRC (1989, 2001). The NRC (1989, 2001) recommended 18% protein (as-fed basis; 20% dry matter basis) in calf starters. Hill et al., (2005) indicated that there was no difference in the performance of calves' feed containing 18 and 22% starters. Sekine et al., (2004), Labussiere et al., (2008) and Ozkaya and Toker (2012) showed that performance and feed intake of calves was not affected by crude protein concentration of the starter. However, Drackley et al., (2002) reported that calves fed with starter containing 22% crude protein were more efficient than those fed 18% crude protein. Bagg et al., (1985) indicated that calves should be fed with diets containing 16.6% crude protein for maximum weight gain between 71-126 days. Bal et al., (2003) indicated that protein requirements of calves were increased after the first 6 months. Moss and Murray (1992) reported that it was suitable to fed calves with containing %16 CP and they also reported, live weight gain was not affected due to protein levels of diets. Lohakare et al. (2006) fed calves with diets containing 19.46, 16.22 and 24.81% crude protein and they reported that live weight gain and feed intake of calves was not affected due to protein levels of diets. Brosh et

al. (2000) reported that live weight gain of calves increased fed due to feeding of 14.6% crude protein than 12.6 and 10.6% crude protein in the diet. Akey (2007) indicated that more research is needed to justify feeding starters that have greater concentrations of protein. Previous studies showed that a protein level of diets for livestock varies between countries. Therefore, the objective of the present study is to determine the effects of protein levels on growth performance of female Holstein calves during the post-weaning period.

Materials and methods

All the experimental procedures were reviewed and approved by the Animal Tests Local Ethical Council of Suleyman Demirel University, Turkey.

Twenty, 60 days old female Holstein calves were produced from the Red-White Animal Farm depending on Cattle Breeders' Association of the province of Isparta. The calves were randomly divided into 2 groups comprising of 10 animals each of and were fed different levels of protein (18 and 22% crude protein). Calves were offered diets, alfalfa hay and water as a free choice daily. All calves were housed into group paddock.

Composition of calf diets, alfalfa hay and extraction soybean meal used throughout the study is presented in Table 1.

Table 1. Composition of diets, alfalfa hay and extraction soybean meal

Item	Diet (1)	Diet (2)	Alfalfa hay	Extracted soybean meal
DM, %	88	89,20	93.39	90.07
OM, %	81,21	82,40	83.47	83.58
CP, %	18,31	21,75	15.06	48.43
E. Ex., %	4,75	4,09	2.06	1.05
CF, %	8,25	8,30	30.49	4.50
NFE, %	49,79	48,26	35.86	29.60
ADF, %	-	-	29.08	-
NDF, %	-	-	40.19	-
Ash, %	6,9	6.80	9.92	6.49
ME, kcal/kg	2665	2651	1631	2800

DM: Dry matter, OM: Organic matter, CP: Crude protein, E. Ex: Ether extract, CF: Crude fibre, NFE: Nitrogen free extract, ADF: Acid detergent fiber, NDF: Neutral detergent fiber

The Live weight and BM of individual calves were recorded at monthly intervals in the morning before feeding. Diet, alfalfa hay and water picked up in front of calves at night in order to assess the change in LW. The experiment was continued for 4 months.

The results were assessed by repeated measurements analysis of variance using SPSS 16.

Results and Discussion

Effect of protein levels on growth parameters are shown in Table 2.

Table 2. The effects of protein levels on growth performance of calves

Parameters, calf		18% CP	22% CP
		Mean ± S.E.	Mean ± S.E.
LW, kg	Initial	59.55±5.22	64.55±5.22
	Final	138.45±12.07	157.50±5.22
BW gain/calf/day (kg)		0.658±0.07	0.775±0.03
BL, cm	Initial	80.15±1.90	83.25±1.90
	Final	100.65±2.62	102.40±2.62
WH, cm	Initial	86.15±1.70	88.45±0.52
	Final	101.45±2.71	105.60±2.71
CD, cm	Initial	35.10±1.02	35.95±1.02
	Final	45.30±1.26	45.80±1.26
CG, cm	Initial	86.35±2.39	89.90±2.39
	Final	115.90±3.55	121.55±3.55
HH, cm	Initial	90.80±1.77	90.80±1.77
	Final	106.90±2.56	109.20±2.56
HW, cm	Initial	23.80±0.63	24.45±0.63
	Final	30.85±0.98	31.95±0.98

S.E.: Standard error

Initial LW of calves was not statistically significant ($P > 0.05$) between the two groups (Tab. 2). Average daily weight gain obtained was 0.658 and 0.775 kg (18 and 22% CP, respectively) at the end of experiment. Although the numerical differences were found between protein levels of diets on LW, these differences were not significant ($P > 0.05$). Akayezu et al., (1994) reported that calves' live weight increased due to the increase protein level, maximum growth was obtained with the amount of 19.6% CP and also reported there was no advantage of 22.4% CP level at 56 days of age. Study was conducted examine the effects of level of protein on live weight; Stobo and Roy (1973) reported performance of calves was better with fed

high level of protein than low protein level. Luchini et al., (1991) reported that no difference in performance of calves fed 18 and 22% protein starters through 84 days of age. Ozkaya and Toker (2012) reported that performance of calves in the pre-weaning period was better with fed 22% CP than those fed with 18% CP level but there was no difference between protein levels at 56 days of age. Moss and Murray (1992) reported that to maintain a live weight gain of 0.7 kg/day the weaned dairy calf needs a diet supplying 16% CP and also reported that there was no effect on live weight gain when protein level of diet was increased. However, Akey (2007) reported that calf gain improved linearly with increasing level of protein in the starter from

0-42 days but, after 56 days, there were no difference in gain when calves fed the 18 and 21% protein. Stamey et al., (2005) reported that no differences between 18 and 22% protein. The similar results were observed in Bilginturan (2012).

All the parameters related to growth performance were measured to investigate the effect of levels of protein during the post weaning period. In all the parameters namely BL, WH, CD, CG, HH and HW were not affected significantly ($P > 0.05$) due to increase in crude protein levels from 18 to 22%. Results are in agreement with the findings of Hill et al., (2005), Ozkaya and Toker (2012) and Bilginturan (2012).

Conclusion

The protein level of diet has no effect on post-weaning performance of calves. However, LW and BM were increased due to protein level of diets. According to our result rearing of calves to diets containing 22% CP yielded better results compared to 18% CP.

Acknowledgments

We would like to thank the Suleyman Demirel University Research Council for funding this study. Project No: 2744-M-11

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