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Effects of Weaning Age on the Growth and Starter Intake in Holstein Calves

Mohammad Bojarpour, Ali Nargeskhani and Mohammad Reza Ghorbani
Department of Animal Science, Faculty of Animal Science and Food Technology,
Ramin Agricultural and Natural Resources University, P.O. Box 6341733877,
Mollasani, Ahwaz, Iran

Abstract: Twenty four Holstein calves (initial BW = 40±3 kg) were used to investigated the effects of weaning age on the growth rate and starter intake. Calves remained in individual pens until the conclusion of the study. Calves received whole milk twice daily while water and starter were offered for *ad libitum* intake throughout the trial. Calves were randomly assigned at 8 weeks of age to one of two treatments: 12 Calves were weaned at 8 weeks of age, 12 Calves were offered milk until 13 weeks of age. From birth to 8 weeks of age starter intake were measured daily. From 8-13 weeks of age starter intake were measured weekly while body weight was measured at birth and weekly during the experimental period. Data indicate that one week post weaning, Average Daily Gain (ADG) was significantly ($p<0.05$) greater in dairy calves than in those weaned at 8 weeks. However from 10-13 weeks the ADG of weaned and dairy calves were not significantly different. The survey of weekly Dry Matter Intake (DMI) illustrated that while there were no differences at 8 and 9 weeks, the calves that were weaned at 8 weeks had a significantly greater DMI ($p<0.01$) during 10 weeks through to 13 than dairy calves.

Key words: Dairy calves, weaning, starter, average daily gain, milk, Iran

INTRODUCTION

Calf rearing programs have changed over the last several decades. Recent studies on early weaning of dairy calves indicate that the calves can be weaned successfully earlier (Winter, 1985). Preweaned dairy calves requires more minutes of time per day to feed and care for than any other animal on the farm. In addition, early weaning program reduces feed cost because of early transition to dry feeds which are more economical than milk (Yanar and Aydin, 2000). The effects of early weaning on the growth and performance of dairy calves have been studied by several researchers. Hopkins (1997) examined the effects of the consumption of 3.8 L of whole milk either once daily or as two equal feedings for calves those were weaned at 28 or 56 days of age.

They showed that calves that were weaned at 28 days and fed 3.8 L of whole milk once daily had no adverse health effects and had acceptable growth and average daily gain. Winter (1985) found that calves weaned at 3, 5 or 7 weeks of age were the same in terms of performance. Increased ruminal concentration of VFA and absorptive and metabolic activity ruminal epithelium occur with increased feed intake (Quigley, 1996; Anderson *et al*., 1987). Blood VFA generally increase with age and dry feed intake in calves (McCarthy and Kesler, 1956) and lambs (Reid, 1953). Murdock and Wallenius (1980) suggested that feeding high grain rations to promote increased ruminal butyrate and concomitant ruminal development may allow early weaning. The objectives of this research study were to determine the effects of weaning age on growth and starter intake of Holstein calves.

MATERIALS AND METHODS

This study was held on milk and meat co. This co is one of biggest co in Isfahan Province. Twenty four Holstein calves (initial BW = 40±3 kg) were used in this trial. Calves were removed from their dams and housed in individual pens huches bedded with straw during the study. Calves fed 1/5 L of fresh colostrums by nipple bottle at birth and again after 4 h and every 12 h thereafter. Frozen colostrums were thawed by placing in warm tap water. Calves were fed colostrums for 3 days then switched to milk. Calves received whole milk twice daily at 07:00 and 16:00 h; calf starter and water were offered for *ad libitum* intake throughout the trial.

Corresponding Author: Mohammad Reza Ghorbani, Department of Animal Science,
Faculty of Animal Science and Food Technology, Ramin Agricultural and Natural Resources University,
P.O. Box 6341733877, Mollasani, Ahwaz, Iran

Table 1: Composition of calf starter diet (as-fed basis)

Ingredients (%)	Starter
Corn	35.0
Barly	20.0
Cotton seed meal	5.0
Soy bean meal	25.0
Fish meal	1.0
Bran	9.5
Salt	0.5
Vitamin premix[1]	1.0
Mineral premix[2]	1.0
Calcium carbonat	1.0
Sodium bicarbonate	1.0

1 and 2-Supplied per kilogram of diet: vitamin A, 10000 IU; vitamin D3, 9790 IU; vitamin E, 121 IU; B12, 20 μg; riboflavin, 4.4 mg; calcium pantothenate, 40 mg; niacin, 22 mg; choline, 840 mg; biotin, 30 μg; thiamin, 4 mg; zinc sulfate, 60 mg; manganese oxide, 60 mg

Composition of calf starter is shown in Table 1. Calves in groups balanced by sex were assigned randomly at 8 weeks of age to one of two treatments: 12 Calves were weaned at 8 weeks of age, 12 Calves were offered milk until 13 weeks of age. From birth to 8 weeks of age starter intake were measured daily. From 8-13 weeks of age starter intake were measured weekly while body weight was measured at birth and weekly during the experimental period. Calves were weighed always at the same time, immediately prior to afternoon feeding. The experimental design was a randomize complete block design. Calves were blocked according to sex and within continuous data collected over time were analyzed by GLM procedure of SAS (1996). Body weight at 8 weeks of age was used as covariate.

RESULTS AND DISCUSSION

Compare of weekly ADG illustrated that 1 week post weaning (week 9), ADG was significantly ($p<0.05$) greater in dairy calves than in those weaned at 8 weeks (Table 2). Decrease of ADG 1 week post weaning was predictable. During at 10, 11, 12 and 13 weeks ADG was no significantly difference between treatments. Also, from 10-13 weeks the ADG of weaned and dairy calves were not significantly different (Table 3). Survey of average daily gain in male and female calves indicated that male calves had greater average daily gain than female calves at 9 and 13 weeks ($p<0.01$).

Winter (1985) reported that Calves weaned successfully as early as 2-3 weeks of age without effect on growth. Also, Quigley (1996) indicated that when milk replacer was fed at 5% of BW from 29-35 days, BW gain was reduced compared with that of calves was fed at 10% of BW; however, BW at 56 day was unaffected by treatment. Survey of weekly DMI indicated that there was not significantly a difference between weaned and dairy calves at weeks 8 and 9. During at 10, 11, 12 and 13 weeks

Table 2: Comparison of weekly average daily gain (kg day^{-1})

	Treatments		
Age (weeks)	Weaned	Dairy	SE
8	1.00	0.89[b]	0.075
9	0.70[b]	0.86[a]	0.065
10	0.88	0.93	0.880
11	1.13	0.98	0.077
12	1.16	1.08	0.068
13	1.27	1.20	0.066

[a,b] Within a row, values with different superscripts differ at $p<0.05$

Table 3: Calves performance from 8 weeks through 13 weeks

	Treatments		
Item	Weaned	Dairy	SE
ADG (kg days^{-1})	1.00	0.98	0.03
DMI (g days^{-1})	2490[c]	2100[d]	57.85
Weight at 8 weeks (kg)	69.85[a]	66.70[b]	0.97
Final weight (kg)	105.15	101.50	1.40

[a,b]Within a row, values with different superscripts differ at $p<0.05$; [c,d]within a row, values with different superscripts differ at $p<0.01$

Table 4: Comparison of weekly dry matter intake (g day^{-1})

	Treatments		
Age (weeks)	Weaned	Dairy	SE
8	1480	1400	60.000
9	1826	1658	70.880
10	2217[a]	1922	100.000
11	2641[c]	2213[d]	88.030
12	3148[c]	2531[d]	97.060
13	3633[c]	2866[d]	99.000

[a,b]Within a row, values with different superscripts differ at $p<0.05$; [c,d] within a row, values with different superscripts differ at $p<0.01$

weaned calves consumed more starter than dairy calves ($p<0.01$) (Table 4). Results in this trial were similar to those reported by Hopkins (1997).

When the weeks 10 through to 13 was evaluated it was observed that Calves were weaned at 8 weeks had a significantly greater DMI ($p<0.01$) than dairy calves (Table 3). This reduction in calf starter intake might have been due to continued milk feeding. The inhibition of calf starter DMI by continued milk or MR feeding is well documented (Hodgson, 1971; Huber *et al*., 1984). Survey of DMI in male and female calves indicated that male calves consumed more starter than female calves ($p<0.05$). Experiment results showed that weaning calves only have down daily gain in 9th week. In this age, calves had not adequate daily gain but had adequate feed intake, therefore with more starter intake decreased weight was recovery. Also, down daily gain at 9th week might have been due to stress weaning.

CONCLUSION

In this study, the weaning calves at 8th week have not lower weight daily gain than they that are weaned at higher weight. In the other hand, calves that weaned at

8th week will have high starter intake that lead to development of rumen and decrease costs of feeding. On based of results this study suggests that after weaning we should give the calves clean and fresh water. It is better that a week after weaning for protects and more attention, calves maintain in individual pens.

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