

## EFFECTS OF “AD LIBITUM” MILK INTAKE ON PERFORMANCE OF DAIRY CALVES

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### ABSTRACT

*Conventional milk feeding for calves was compared with feeding milk “ad libitum” consumption from a rubber nipple. Calves fed “ad libitum” ingested more milk than calves fed conventionally. Average daily gain for the calves fed “ad libitum” was 0,718 kg in the first 28 days of age compared to 0,288 kg for the conventionally fed calves. By day 28 this difference in gains resulted in a significant 12,1 kg weight advantage for the “ad libitum” fed calves.*

### INTRODUCTION

Intensively reared dairy calves are typically separated from the cow and fed restricted quantities of milk until weaning. The common practice is to provide calves with milk twice a day in quantity of 10% of the calf’s body weight (BW). A 38-40 kg calf would receive two meals each of 2 kg.

In contrast, a calf left with its dam will suckle 8 to 10 times a day and consumes much more milk.

One simple method of increasing milk intake is to provide milk for “ad libitum” consumption through a teat.

This system allows calves to express their natural sucking behavior (Chua et al., 2002).

Most producers continue to feed restricted quantities of milk to calves, because of the perception that increased milk intake leads to a higher incidence of diarrhea, or that it leads to reduced intake of solid feed, resulting in reduced weight gains.

Reported benefits of intensive calf feeding programs are increased weight gain without increased fat deposition (Bascom et al., 2007) along with improved feed efficiency and increased stature during the preweaning period (Brown et al., 2005, Cowles et al., 2006).

Raeth-Knight et al., 2009, reported an increased calf body weight and hip height during the preweaning and early postweaning period of Holstein heifer calves in intensive milk feeding program compared with heifers in conventional program. Also heifers that received more milk calved 27,5 days earlier than those fed restricted quantities of milk.

Some studies report a negative effect of increased milk allowance on health of dairy calves (Quigley et al., 2006).

Borderas et al., 2009 examined the influence of milk feeding level (4 lvs. 12 l) on feeding behavior in group housed calves and no difference were found between treatments at 2 weeks of age.

Little is known about feeding milk from transition and sick cows. This milk cannot be sold, and can be fed to calves with precautions.

The current experiment was designed to compare the effects of “ad libitum” milk intake versus conventional feeding. Standardized procedure for measuring and reporting calf performance data are presented (Larson et al., 1977). Specifically, we measured milk, starter and hay intake, BW and incidence and duration of diarrhea from birth through 28 days of age.

## MATERIALS AND METHODS

Twelve normal Holstein female calves born in the Dairy Farm of Agricultural Research and Development Station (ARDS) Simnic during April to July were assigned alternately to the conventional and the “ad libitum” milk feeding treatment. All calves received colostrums from their respective dams from birth to three days of age and housed in individual pens. Pens had solid wooden sides with opening in the front to allow calves free access to a corn grain based starter (86,8% dry matter, 20,7% crude protein) chopped alfalfa hay (81,3% dry matter, 16,9% crude protein) and water. All calves were fed whole milk, including milk from fresh and treated cows (pasteurized at 72 °C for 15 seconds).

Conventionally fed calves were given milk from open, 5 liters plastic buckets twice daily (07:00 and 17:00). Milk quantity totaled 10% of the calf's body weight (BW), distributed evenly across the two feedings. Calves were weighed weekly, and milk weight was adjusted individually according to each calf's weight.

“Ad libitum” fed calves were allowed continuous access to milk via a rubber nipple connected to a plastic tube that ended with a weighted one-way valve in the 15 liters plastic bucket. Fresh milk was weighed and distributed twice daily. Prior to the each feeding, leftover milk was weighed and discarded, and the milk feeding system cleaned.

Milk intake was measured daily, starter and hay consumption were measured twice a week, and BW once a week. Any diarrhea was noted daily and treated with electrolytes.

Average daily gain, and average daily intake of milk, starter and hay were calculated. The number of days scouring were also calculated as percentage of calf days (reflects not only incidence but also duration).

## RESULTS AND DISCUSSION

This paper presents the results of first 28 days of the age of calves. As revealed by the ranges in the relative milk intake, variability was large, particularly at the high levels of consumption. The quality of milk ingested by calves fed “ad libitum” tended to decline as they became older (Table 1).

Table 1

Age of calf	Relation of daily intake to body weight			
	Conventional		“Ad libitum”	
	Mean (%)	Range (%)	Mean (%)	Range (%)
4-7 days	7.30	6.5-8.6	13.60	12.1-15.6
8-14 days	8.83	7.6-10.0	15.52	14.0-16.9
15-21 days	9.85	9.6-10.0	17.02	14.0-18.1
22-28 days	9.92	9.8-10.0	15.90	14.2-17.8
4-28 days	8.98	6.5-10.0	15.51	12.1-18.1

Starter and hay intake was negligible for both treatment groups until calves were 14 days old. Consumption increased after day 14 especially for the conventionally fed calves.

The “ad libitum” fed calves gained weights at a faster rate than the conventionally fed calves until 28 days of life (Table 2). After initiation of this experiment in conventionally fed calves weights declined (1,2% from initial birth weight as results of lower environment temperature in April).

Average daily gain for the calves fed “ad libitum” was 0,718 kg in the first 28 days of age, compared to 0,288 kg for the conventionally fed calves. By day 28 this difference in gains resulted in a significant 12,1 kg weight advantage for the “ad libitum” fed calves.

Table 2

**Relative changes in weights of calves fed different levels at whole milk**

Age of calves (days)	Relativ changes in weight (%)	
	Conventional	“Ad libitum”
Birth	100.0	100.0
7	98.80	106.80
14	108.30	120.50
21	113.20	135.00
28	120.20	150.20

A comparison of expressions of combined incidence and duration of diarrhea among calves fed by the level of milk feeding, indicates less difficulty in those calves that were fed conventionally (Table 3).

Table 3

**Diarrhea in calves fed conventional and “ad libitum”**

Level of milk feeding	Number of calves	Diarrhea in calves at different ages (days)			
		4-7	7-14	14-21	21-28
		% calf days			
Conventional	6	8.3	9.5	14.2	14.2
“Ad libitum”	6	12.5	19.0	23.8	28.6

Filling the abomasums with large amounts of milk possibly could impose several physiological processes associated with digestion of milk (rate of milk coagulation by rennet, rate of milk fat hydrolysis).

**CONCLUSIONS**

- “Ad libitum” feeding of milk allowed calves to consume much more milk.
- Calves fed more milk gained weight much more rapidly.
- No signs of disease other than diarrhea and the level of this ailment was higher in “ad libitum” fed calves.
- It appears that the biology of the calf allows for rapid growth during first weeks of life.
- It is necessary to study the effect of inclusion of milk from treated cows (waste milk) in milk feeding of calves.

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