

# Performance of Friesian Holstein Cross Post Colostrums' Calves Reared Under Free Choice Feeding System

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## Abstract

*The aim of this experiment was to evaluate the free choice feeding technique on performance of Frisian Holstein Cross POST colostrums calves on early weaning programs. Six FH calves were divided into two feeding systems. Half of them were fed with mix diet and another half were subjected to free choice diet. Mix diet consists of 38.65% corn, 28.98% wheat brand, 28.98% soybean meal and 3.39% mineral mix. The free choice diets consisted of corn, wheat brand, soybean meal, coconut meal and mineral mix served in separate feeding buckets. The data obtained were analyzed using analysis of variance and any significant differences were subjected to T-Test. There were no significant different on dry matter intake, total digestible nutrient, fiber, Ca and P intakes, weight of weaning calves and feed efficiency between the treatment, but the treatment were significantly affected the protein intake, milk intake, weaning time and body weight gain. It was concluded that the free choice diets technique provide nutrients to support a good performance of FH calf on early weaning program.*

*Key words : free choice diet, Friesian Holstein, performance, rearing*

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## Introduction

Although post colostrums calves rearing program by a large farm who have good records of production history is one of business opportunity to provide good qualities of bulls and cows replacement stocks, but the program is high-risk. This is caused by the fact that raising calves from birth to weaning is one of the most difficult periods of cattle husbandry. The greatest risk in this period is disease and mortality factors. The important strategy to reduce the risk is through feeding management. Management of feeding that appropriate with calf requirement before weaning will affect its production performance later on.

Nowadays, variation program to formulate rations have been used by many feed producers, but the programs do not guarantee the balance between the ration

prices with their economical impact to the farmer. To find a suitable feed formula in the field, free choice feeding technique can be used.

Free choice feeding technique would provide a freedom for livestock to choose. In this case, pre-weaning calf will choose feed using their instinct. Keskein et al. (2004) stated that free choice feeding technique improved animal welfare through nutrients requirement fulfillment. Free choice feeding technique also provided the opportunity for calves to make their own feed formula to support their rumen development and make them comfort (Nicol, 1997).

This study was designed to get the most proper starter ration formula for calves rearing program which could satisfy calves requirements, enhance calves performance and improve efficiency of feed utilization.

## Material and Methods

This study used 6 male weaning calves of Frisian Holstein (FH) hybrid with initial body weight of  $38.34 \pm 2.34$  kg. The calves were reared in individual cage. Two feeding systems were employed as treatments, namely 1) the free choice feeding system (FCFS) and 2) the complete mix feeding system (CMFS). In both systems, similar feed ingredients were offered. They were maize, pollard, Soybean meal, coconut meal, salt,  $\text{CaCO}_3$  premix and fresh milk.

The calves were divided into two groups and each group consisted of three calves (as replications). The first group was subjected to the FCFS treatment, while second group was given the CMFS treatment. The calves were kept in individual cages and observed for 46 days.. The feeds were offered ad libitum every day from 6:00 am to 07:00 pm. Each calf was given 4 litres milk, twice a day, 2 liters in the morning and 2 liters in the afternoon. Drinking water were provided ad libitum.

## Results and Discussion

### *Dry Matter and Nutrient Intake*

Average of feed and nutrients intake of both feeding systems was shown in table 1. The data analysis showed that the treatments had no effect on the dry matter intake (DMI). The DMI of CMFS treated calves were 710.12 g/head/day or equal to 1.47% body weight (BW) while DMI of FCFS treated calves were 940.83 g/head/day (2.02% BW). These intakes satisfied DMI requirement of calves according NRC (2001) feeding standard. According to NRC (2001), dry matter requirement for 30 - 60 kg BW calf with 0.4 - 0.6 kg average daily gain (ADG) was 560-1040 g/head/day (1.4% -1.7% BW). The FCFS treated calves obtained different ingredient compositions from the CMFS treated calves. Proportion of soybean meal consumed by FCFS treated calves was higher (80%) than consumed by the CMFS (28.98%), while the proportions of corn and pollard consumed by the FCFS treated calves

were lower (15% and 4%, respectively) than the CMFS treated calves (38.65% and 28.98%, respectively).

The calves fed with FCFS had opportunity to choose ingredients with high protein content such as soybean meal to satisfy their protein requirement. The ingredient was consumed much more than corn, pollard, and coconut meal which contain less protein. Although, maize, pollard, and coconut meal contained less protein than soybean meal, their nitrogen free extract (NFE) content was higher. Forbes (1995) stated that high content of NFE in feed lowered its consumption. He also proved that soybean meal had better palatability than other materials. Table 1 showed that CP consumption of FCFS treated calves were significantly higher ( $P < 0.05$ ) than of the CMFS treated calves, but in both systems, consumption of total of digestible nutrients (TDN), crude fiber (CF), Ca, and P were not significantly different. Sutardi (1981) stated that CP requirement of 1–4 months calves with 30-64 kg BW were 120-210 g/head/day, while according to NRC (2001), the CP requirement for calves with 30 - 60 kg BW and 0.4-0.6 kg ADG were 141-217 g/head/day. Ration consumed by the CMFS treated calves satisfied their CP requirement based on Sutardi (1981) and NRC (2001) recommendations. The calves consumed 195.98 g CP/head/day. The FCFS treated calves however, consumed CP more than their requirements (303.84 g/head/day).

TDN content of feed ingredients ranged from 67.9% to 83.2% while TDN of milk was 129%. According to NRC (2001), TDN requirement for calf with 30–60 kg BW and 0.4–0.6 kg ADG was 0.82-1.21 kg. TDN consumptions in this study were 669.29 g/head/day (CMFS treatment) and 742.29 g/head/day (FCFS treatment). These results indicated that protein requirement for livestock kept in tropical region was different from livestock in temperate regions.

Although ruminants have the ability to digest fiber with their microbe’s help, but calves do not have such ability because their rumen functions have not fully developed. Therefore, their ability to digest fiber is still low. Boga (2009) showed

Table 1. Average of nutrient consumption of concentrate starter and milk (g/head/day)

Consumption	Treatments					
	CMFS			FCFS		
	Starter	Milk	Total	Starter	Milk	Total
CP	68.31	127.67	195.98 ± 6.42 <sup>a</sup>	176.17	127.67	303.84 ± 54.98 <sup>b</sup>
TDN	247.08	419.21	669.29 ± 21.78	323.08	419.21	742.29 ± 103.94
CF	24.05	0	24.01 ± 2.26	21.15	0	21.15 ± 6.87
Ca	0.68	4.34	6.96 ± 0.08	1.36	4.34	9.65 ± 0.45
P	2.36	3.53	5.98 ± 0.28	2.75	3.53	6.30 ± 1.03

Different superscript in the same line means significantly different ( $P < 0.05$ )

that calves offered free choice feeding system formulated ration using their instincts which contained high protein but low fiber.

According to Sutardi (1981), Ca and P requirement for calf with weight 30 - 64 kg was 6.14 - 10.8 g/head/day and 4.09 - 7.22 g/head/day, respectively. In both treatments, Ca and P requirements were fulfilled. Ca and P consumption of CMFS treated calves were 6.96 g/head/day and 5.98 g/head/day, respectively. While the FCFS treated calves consumed 9.65 g/head/day and 6.30 g/head/day of Ca and P, respectively. Thompson (1978) recommended that level of Ca in growing male calf ration was 4.32 g/head/day at the first stage of feeding and 2.16 g/head/day at the end. While levels of P in the ration was 3.33 g/head/day at the first stage of feeding and 1.62 g/head/day at the end.

#### *Weanings Time and Weight, Body Weight Gain, and Feed Efficiency*

Weanings time and weight, body weight gain, and feed efficiency of the calves were shown in Table 2. A calf can be weaned if the calf can consume 0.5-0.7 kg/head/day of calf starter concentrate (Jones and Heinrichs, 2007; Imran, 2009). Weaning in this study was based on the consumption of 750 g/d fresh weight of starter ration for 3 consecutive days. The free choice feeding system provides a more rapid weaning time than the complete mix feeding system (days 31<sup>st</sup> vs. 44<sup>th</sup>). The FCFS treatment allowed the calves to select the preferable feed ingredients to be consumed according to their needs.

Initial and weaning weights in the CMFS treatment were 39 ± 3 and 57 ± 4 kg, respectively. While, the FCFS were 38 ± 2 and 55 ± 1 kg. Boga (2009) stated that weight gain of calves fed under FCFS was higher than the calves fed under the CMFS. The ADG of calves were affected by the feeding system (p <0.05), which showed that the FCFS were higher than CMFS (553.76 vs. 418.97 g/head/day). The higher of calves ADG under FCFS than CMFS were caused by the higher proportion of soybean meal consumed as a protein source (80% vs. 28.98%).

Table 2. The effect of treatment on the weaning time and weight, weight gain, milk consumption and feed efficiency

Variables	Treatment	
	Mix	Free Choice System
Weaning time (day)	44±1 <sup>a</sup>	31±1 <sup>b</sup>
Wean weight (kg)	57±4	55±1
Body weight gain (g/head/day)	418.97 ± 0.06 <sup>a</sup>	553.76±0.05 <sup>b</sup>
Feed efficiency	0.60±0.01	0.61±0.09

Different superscript in the same line means significantly different (P<0.05)

CP consumptions were higher in FCFS treatment than CMFS (303.84 vs. 195.98 g/head/day) that significantly influenced the calves ADG. It was in line to the Parakkasi (1999) statement that higher protein content in ration resulted higher ADG. In opposite, higher content of CF in ration resulted lower ADG.

Feed efficiency in both treatments showed no significant different. The results were suspected from the indifferent of corn and soybean meal digestibility. Milk consumption of calves kept under FCFS was significantly less than CMFS (115 vs. 168 liters). These results were related to the shorter weaning time for FCFS calves than the CMFS.

## Conclusion

Free choice feeding system produces a ration formula consisted of 15% maize, 4% pollard, 80% soybean meal, and 1% coconut meal which contained 85.66% DM, 37.45% CP, 4.62% CF and 82.17% TDN. Cafeteria feeding system produces faster weaning times, and higher body weight gain in compare to the complete mixed feeding system, but do not different in feed efficiency.

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