

Study on the Dynamics of Feed Intake in Suckling Calves

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Abstract

The aim of this study was to investigate the voluntary concentrates intake in relationship with age, as well as the growth rate of calves. Twenty-one calves divided into three groups were used. The body weight at birth and at weaning, total feed consumption and time that calves stayed in the study were measured. Groups 1, 2 and 3 stayed in the study 17, 29 and 50 days, respectively. Daily concentrate consumption (kg) was determined by weighing the concentrates fed, as well as the leftovers. Total feed and milk consumption per calf per day was 5 kg and 0 L, 5.57 kg and 3.31 L, and 9.57 kg and 5.16 L for groups 1, 2, and 3, respectively. Total weight gain was 13 kg, 22 kg, and 43 kg for groups 1, 2, and 3, respectively. In conclusion, the growth rate is dependent on the age, feed consumption and the number of days of receiving concentrates.

Keywords: animal husbandry, animal welfare, calves, nutrition

1. Introduction

The nutrition of calves from birth until adult life is a particularly important consideration because their development and growth depend on it. The first meal a calf receives is the colostrum. It must be fed as soon as possible after calving and after the necessary care of the calf. For the calves' health and survival, the most important factor is the management of the colostrum [1]. The calf is non-ruminant until the digestive system develops, but for that it is necessary to feed a solid diet. This solid diet begins with a starter feed, and it can have multiple forms like pellets etc. The physical characteristics of starter diets, along with their nutritional content, play a significant role in influencing multiple developmental aspects in calves [2]. Rapidly fermentable carbohydrates are supplied to the starter feed via grain

supplementation, which stimulates butyrate production and drives rumen development [3]. Onwards we can include forage in the solid diet or in mixed ration. The feeding of a pelleted calf starter (CS) with forage is necessary to prevent marginal rumen acidosis [4]. Another important element in the calves' diet, which must be administered beginning with the first days of life, is water. Calves require the provision of free-choice water along with the milk or milk substitute [5]. The esophageal groove is a physiological adaptation that allows milk or milk substitutes to pass through the rumen and into the abomasum [5]. All the elements in the calves' diet should be kept clean and fresh and their intake monitored to achieve an easy weaning process. The age for weaning can vary, depending on the feeding method. Therefore, the aim of the study was to investigate the voluntary feed intake in relationship with age, as well as the growth rate of calves.

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2. Materials and methods

Calves, housing and general management

The study was carried out at the Research and Development Station for Bovine Arad and took place between January 15th and March 14th, 2024 (60 days), where 21 calves divided in 3 groups were used. The study included three groups (1, 2 and 3) that stayed in the study 17, 29 and 50 days, respectively. The calves were reared in individual huts, each calf having a useful surface of 4 m². The calf housing was made of a plastic hut with a metal fence on wheels. The hut was provided with a lockable door, supports for water bucket and feed bucket and a support for the teat milk bucket. To ease the cleaning, the huts have an adjustable opening, and also, they are shock resistant and have UV protection. The nutrition of the calves was composed of milk, pelleted starter feed in the first 2 months of life and a mixture of concentrates and pelleted starter until the calves were weaned, as well as alfalfa hay. In the first period of the study, they were fed 6 L of milk per day in two portions up to two months old and, as time passed, the amount of milk was reduced to 3 L and to 0 L when the calves were weaned. On the second day following the arrival of the calves in the huts, fresh starter feed and water were provided. After calves reached a daily consumption of 1 kg concentrates, the amount was limited to 2 kg/day. In this time, the amount of concentrates was gradually increased and the amount of pelleted starter feed was

gradually decreased. Milk allowance was reduced to 3 L/day, when calves reached a concentrate consumption of 1 kg/day. Before the calves were weaned, they received a mixture of pellets and concentrates. The hay and water were administered ad libitum.

Data collection and analysis:

The body weight at birth and at weaning, total feed consumption and time that calves stayed in the study were measured. Consumption of concentrates (kg) was recorded daily based on amounts of the concentrates offered as well as the leftovers. Comparisons between the groups were carried out using Microsoft Excel for data analysis.

3. Results and discussion

Feed efficiency during the early stages of life is a critical factor in the profitability of agricultural systems, given the substantial expenses associated with this period and its impact on subsequent performance outcomes [6].

Group 1 stayed the least in the study, for 17 days. Because calves in this group were weaned, their total milk consumption (L) was zero. Regarding the daily concentrates consumption (kg), as shown in Figure 1, it was equal to 5 kg per calf per day. At the end of the experiment, after 17 days, the total weight gain for group 1 was 13 kg.

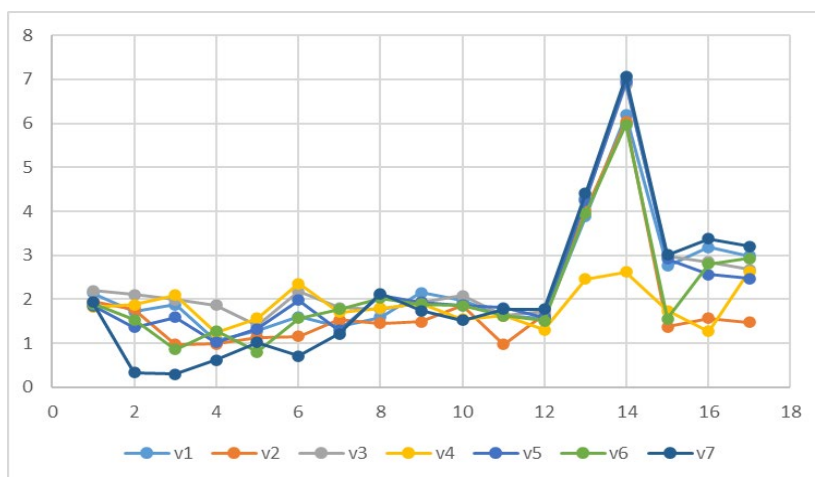


Figure 1. The daily feed consumption of group 1 (v1 to v7 represents the number of calves involved in the group 1)

A total of 29 days was spent in the study by group 2. Their consumption was 5.57 kg feed and 3.31 L

of milk per calf per day. The total weight gain for this group was 22 kg (Figure 2).

The calves in group 3 stayed in the study the longest (50 days) compared to groups 1 and 2. The third group of calves had obtained a total weight gain of 43 kg.

They had a feed and milk consumption per calf per day of 9.57 kg and 5.16 L, respectively (Figure 3). According to another study [7], small quantities of milk are generally administered to enhance starter feed consumption, facilitate rumen development, and reduce the age of weaning.

An understanding of the genetic and metabolic foundations of varying feed efficiency may significantly improve management practices and performance during the early developmental stages

[6]. The initiation of starter intake at early developmental stages may be influenced by multiple factors, encompassing not only the availability of liquid diets but also individual characteristics, including personality traits [8]. Research conducted by Neave et al (2018) [9] indicated that calves exhibiting higher levels of exploratory behaviour commenced starter consumption at an earlier age, demonstrated increased starter dry matter intake (DMI) during both preweaning and postweaning phases, and achieved superior overall average daily gain (ADG).

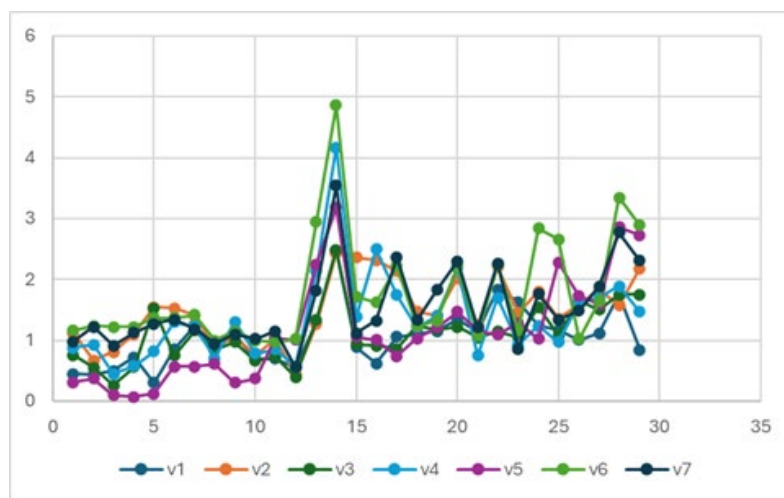


Figure 2. The daily feed consumption of group 2 (v1 to v7 represents the number of calves involved in the group 2)

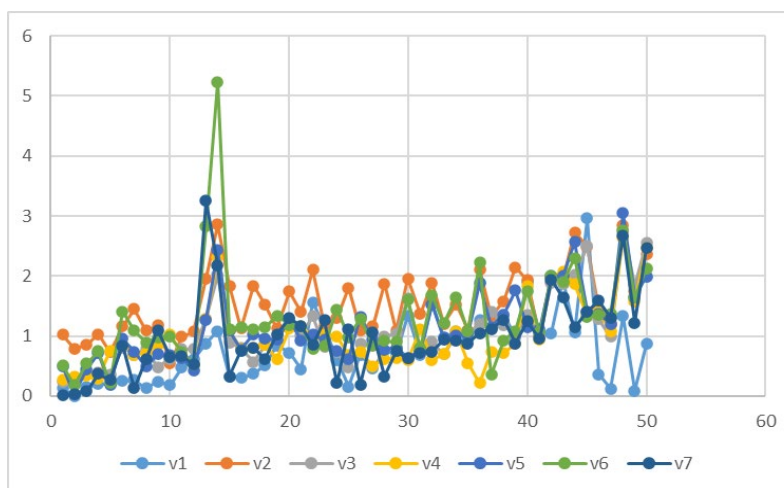


Figure 3. The daily feed consumption of group 3 (v1 to v7 represent the number of calves involved in group 3)

In all the graphs above we can see an increase of feed consumption which started with day 12 of the

study and ended on day 15. Gradual weaning promotes the consumption of starter feed during the

preweaning phase, with both the age at which weaning occurs and the length of the weaning period affecting this intake. An increase in solid feed consumption throughout the weaning stage supports rumen development, facilitating enhanced starter intake and weight gain following weaning [7].

4. Conclusions

In this study we investigated the voluntary concentrates intake in relationship with age, as well as the growth rate of calves.

In conclusion, the growth rate is dependent of the age, feed consumption and the period of days of receiving concentrates.

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