EFFECT OF DIFFERENT PHYSICAL FORMS OF STARTER ON FEED INTAKE AND PERFORMANCE OF CALVES

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Abstract: The objective of this study was to determine the effect of different types of starter on starter intake and growth performance of calves in the period of milk nutrition. The experiment was performed with Czech Fleckvieh calves (n = 28). Calves were housed in outdoor individual boxes. The calves were fed by colostrum (for the first 5 days of life) or milk feed mixture (from the 6th day of life) and starter. For the experiment the calves were divided into 4 groups (fed various types of starter: A – pelleted starter with 20% of oats; B – completely pelleted starter, C – textured starter, D – starter with chopped straw) per 7 calves. The mean age of calves in group was balanced (reached in all groups an average of 13 days) at the start of experiment. The experiment lasted for 32 days. The mean intakes of individual types of starters were relatively balanced (differences between groups are statistically insignificant, P > 0.05). The average daily gain of calves in individual groups for the period was statistically insignificant too (the range is from 0.59 to 0.69 kg/head/day). Based on the evaluated parameters we can conclude that the type (physical form) of starter fundamentally not affects the palatability or attractiveness of starter for calves during milk nutrition.

Key Words: calf, growth performance, pelleted starter, textured starter, starter with chopped straw

INTRODUCTION

Calves entering the feeding phase are adjusting to nutritional and environmental changes, placing them at risk for diseases that negatively affect performance. The owner immediately before this transition is in a unique position to reduce these disease risk factors (Anderson et al. 2009). Calves are born with a physically and metabolically underdeveloped rumen and initially rely on milk to meet nutrient demands for maintenance and growth. Initiation of solid feed consumption, acquisition of anaerobic microbes, establishment of rumen fermentation, expansion of rumen in volume, differentiation and growth of papillae, development of absorption and metabolic pathways, maturation of salivary apparatus and development of rumination behavior are all needed as the calf shifts from dependence on milk to solid feed. In nature and some production systems (e.g., most beef calves), young ruminants obtain nutrients from milk and fresh forages. In intensive dairying, calves are typically fed restricted amounts of milk and weaned onto starter feeds (Khan et al. 2016).

Modern starters are composed mainly of mashed cereal, corn, oats, barley, eventually soybeans and components comprising a structural fiber and have structure of muesli (Mudřík et al. 2006). Starter feeds contain easily fermentable carbohydrates. It is thought, that starter feeds stimulate rumen development, including changes in the epithelium of the forestomach (Khan et al., 2016). The composition and ratios of feed ingredients have a significant impact on the development of forestomach and body weight. Calves fed large amounts of milk replacer (MR) gain more body weight preweaning than calves fed less MR; however, postweaning growth may be reduced because of impaired digestion of nutrients (Hill et al. 2016), but provision of chopped hay to calves fed high volumes of milk can promote solid feed dry matter intake and rumen development without affecting body weight gain (Khan et al. 2011). The provision of high-starch and low-fiber starter feeds may negatively affect rumen development and that forage supplementation is beneficial for promoting development of the gut and rumination behavior in young calves. It is important to note that both the physical form of starter diets and their nutritional composition affect various aspects of development.
in calves. Further research is warranted to identify an optimal balance between physically effective fiber and readily degradable carbohydrates in starter diets to support development of a healthy gut and rumen, rumination behavior, and growth in young calves (Khan et al. 2016).

Starters are composed of different types of cereals (corn, oats, barley etc.). Regarding oat, under the conditions of study (Suarez-Mena et al. 2015), greater rumen weight and papillae length in calves fed pelleted oats starter may be the result of greater nutrient availability of oats. Grain, mainly corn, has traditionally played a major role in the cattle feeding industry because of its higher energy content when compared to roughages (Hill 2012). Calves on a corn diet have greater ruminal capacity to accommodate feed bulk. More physically and metabolically functional rumens in calves on corn and wheat diets probably resulted in greater feed consumption and nitrogen retention (Khan et al., 2008). Calves on corn diet consumed more solid feed and gained greater body weight than those fed barley, oat, and wheat diets (Khan et al. 2007). In turn it is important that nutrition calves contains a structural fiber (forage). In conclusion of study (Castells et al. 2013), calves supplemented starter with oat hay have a better rumen environment than calves offered no forage and do not have an increased gut fill. The results of experiments about physical forms of starters are inconsistently (Franklin et al. 2003, Bach at al. 2010, Terre et al. 2015) and next research is necessary.

MATERIAL AND METHODS

The experiment was performed with Czech Fleckvieh calves (n = 28). Calves were housed in outdoor individual boxes with straw bedding. The calves were fed by colostrum for the first 5 days of life. Milk feed mixture calves receiving from the 6th day of live. Milk was offered in three doses in a total quantity of 7 liters per day (2.5 liters in the morning, 2 liters in noon and 2 liters in the evening). Access to drinking water and starter was ad-libitum from first day of live. The calves were divided into 4 groups (A, B, C, D) per 7 calves, for the experiment. The mean age of calves in group at the start of experiment was balanced (reached in all groups an average of 13 days). The A group had available to complete pelleted starter which was mixed with 20% of oats. Group B calves had access to completely pelleted starter without addition of any components. To calves from C group had presented textured starter contains pellets, oats, maize grain and maize flakes. The last group (D group) had access to mixture of ground cereals, extruded maize grain, protein-energy concentrate and chopped what straw. The starters intake was evaluated daily. The calves were also weighted at regular intervals in order to evaluate their body weight gain. The experiment lasted for 32 days from August to September. The average age of the calves in each groups was 45 days. Based on the records and evaluation of daily starter consumption by calves were calculated the average intake of starter between day 20–23, 30–33 and between days 39–42 of calves age in each group. The average daily gain of calves it was also calculated.

Data has been processed by Microsoft Excel (USA). To ensure evidential differences Student’s t-test was applied and P < 0.05 was regarded as statistically significant difference.

RESULTS AND DISCUSSION

Development of intake of individual types of starters is shown in Figure 1. The intakes of individual types of starters were relatively balanced. It is not possible to do conclusion on different palatability of individual starters. In the first reporting period between day 20 to 23 of calves age was daily intake of starters averaging between 180–305 g/head/day. Between calves were big differences. While some calves didn’t eat starters in that age, some calves taken starters to 850 g/day. When evaluating the daily consumption of starter during the one month of calves age (30th–33rd day of age) we can see the mean intake of starters ranged from 505 to 723 g/head/day in this period. Certain tendency to the highest intake of starter is in the C group, which received the textured starter (pellets, whole grains and flakes). However, differences between groups were statistically insignificant (P > 0.05). A similar trend continues until the end of the period between 39th–42nd day of age of calf. The mean intake of starter in each group ranged from 835 to 1241 g/head/day. The highest intake persisted in Group C. The differences were not statistically significant as well. We can say that palatability of receiving various types of starters (pelleted, pelleted with whole oats grain, textured, and starter with chopped straw) was balanced. The average starter intake by calves about the 40th day of age moving around 1 kg corresponds
to the results of experiments by other authors (Bach et al. 2010, Hosseini et al. 2015) in their experiments starter intake by calves at the same age was around 0.8 kg/day.

The results of consumption of different starters are consistent with the average daily gain of calves (Figure 2). The figure shows that the average daily gain of calves in individual groups for the period (an average age of calves in all groups for 45 days) was non-significantly different. The range is from 0.59 to 0.69 kg/head/day. The average daily gain of calves under the age of 45 days moving about 0.6 kg is slightly higher than the gain in publication of Terré et al. 2015, where the growth of calves was about 0.5 kg.

Figure 1 Mean intake (g/day) of individual types of starters (A – pelleted starter with 20% of oats; B - completely pelleted starter, C - textured starter, D - starter with chopped straw)

Figure 2 The mean average daily gain (kg) of calves consumed different starter (A – pelleted starter with 20% of oats; B - completely pelleted starter, C - textured starter, D - starter with chopped straw)
CONCLUSION

Based on the evaluated parameters we can conclude that the type (physical form) of starter fundamentally not affects the palatability or attractiveness of starter for calves during milk nutrition.

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REFERENCES


