Animal Feed Science and Technology 164 (2011) 130–134

Contents lists available at ScienceDirect

Animal Feed Science and Technology

journal homepage: www.elsevier.com/locate/anifeedsci

Short communication

Effect of flavoring a starter in a same manner as a milk replacer on intake and performance of calves

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ARTICLE INFO

Article history:
Received 18 August 2010
Received in revised form
29 November 2010
Accepted 30 November 2010

Keywords:
Flavor
Palatability
Preference
Weaning

ABSTRACT

The effects of including the same flavor additive in a milk replacer (MR) and a starter to facilitate a sensorial association between the flavor of starter and that of the MR were explored in an attempt to encouraging calves to increase solid feed consumption around weaning. Twenty-two male Holstein calves (initial body weight = 51.2 ± 0.82 kg; age = 22 ± 1.6 d) participated in this study. All calves consumed the same starter during the first 34 d of study and were weaned at 42 d of study (65 d of age). The study finished 14 d after weaning. All calves received the same flavored MR and during the 7 d preceding weaning until the end of the study, half of the calves were fed a pelleted starter with the same flavor as that of the MR around weaning, whereas the remaining calves were offered the same starter without flavor. Starter and MR consumptions were registered daily, and BW recorded weekly. Overall, starter intake was not affected by flavor addition. However, calves with the lowest solid feed consumption before weaning (days 28–34 of study), numerically (P=0.11) consumed more starter following weaning when the starter was flavored compared with calves receiving plain starter. These calves also tended (P=0.06) to have a greater average daily gain during the 14 d following weaning compared with calves within the same low level of solid feed consumption but that consumed the unflavored starter. Flavoring calf starters in the same manner as MR might improve solid feed consumption and performance of calves with a low appetence for solid feed before weaning.

1. Introduction

At weaning, calf access to milk replacer (MR) is progressively reduced until animals must entirely depend on solid feed to acquire nutrients. An increase of solid feed consumption during this stage is needed to ensure adequate rumen development, growth performance, and health, and reduce labor and production costs associated to weaning (NRC, 2001). Stress and potential pathologies around weaning may render calves unable to compensate the decrease in MR offer by sufficiently increasing consumption of solid feed, resulting in a decrease in total dry matter consumption and a consequent decrease in

Abbreviations: ADFom, acid detergent fiber (exclusive of residual ash); ADG, average daily gain; aNDFom, neutral detergent fiber (assayed with heat-stable amylase and exclusive of residual ash); BW, body weight; CI, conversion index; DM, dry matter; DMI, dry matter intake; MR, milk replacer; S0, unflavored starter; SF, starter supplemented with the same flavor that was added to the MR.

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doi:10.1016/j.anifeedsci.2010.11.023

Table 1
Ingredient and nutrient composition (g/kg of DM) of plain starter (0), flavored starter (F), and milk replacer.

	Starter 0	Starter F	Milk replacer
Ingredients			
Barley	50	50	–
Corn	224	223	–
Oats	180	180	–
Wheat	50	50	–
Soybean	210	210	–
Wheat middlings	280	280	–
Dry sweet whey	–	–	189
Salt	0.9	0.9	–
Premix	4	4	–
Calcium carbonate	0.8	0.8	1
Dry skim milk	–	–	560
Palm oil	–	–	100
Wheat starch	–	–	80
Coconut oil	–	–	70
Flavor	–	1.3	–
Nutrients			
DM	898	897	957
aNDFom	219	220	–
ADFom	75	80	–
CP	134	132	169
Ether extract	37	36	180
Ash	45	47	67

average daily gain (ADG) around weaning (Terré et al., 2006). A potential method to foster solid feed intake could consist on offering a highly palatable starter.

Recently, Thomas et al. (2007) reported that calves seem to have a preference for orange smell of water, and other authors have reported a preference for sweet products on feeds for ruminants (Goatcher and Church, 1970; Nombekela and Murphy, 1995). In addition, it has been hypothesized that feeding behavior of ruminants is influenced by previous experience with different feed types (Provenza and Balph, 1987). This hypothesis has been reinforced by Simitzis et al. (2008), who described that lambs selected in favor of feeds with flavors to which they had been exposed to early in life. Therefore, the objective of the current study was to determine whether flavoring a MR and a subsequent starter with an orange flavor combined with a sweetener would increase solid feed intake around weaning.

2. Materials and methods

2.1. Animals and design

Twenty-two male Holstein calves (22 ± 1.6 d old and 51.2 ± 0.82 kg of BW) were purchased from commercial farms and raised in the facilities of IRTA (Prat, Spain) under the guidelines of the IRTA Animal Care Committee. Calves were individually-housed in wooden pens ($1\,m \times 1.55\,m$) bedded with sawdust. These pens were in a barn with forced ventilation. Starting the first day of study, all calves received the same MR (Sprayfo, Slote, Holland) flavored with a sweetener completed with orange smell (Luctarom® SFS-R, Lucta, Spain), was added to the MR at a rate of 1 g/kg just before mixing it with water (Table 1). All animals were offered the same unflavored starter (Table 1). Water and starter were offered *ad libitum* until the end of study at 56 d. Water was offered in individual buckets, and the starter was offered in individual metal troughs. Milk replacer was fed in buckets twice daily (2 L each time) at 0730 and 1630, at 125 g/L dry matter (DM) during the first 35 d of study. The experimental period of the study started at day 35, when MR was reduced to 2 L per day offered at 07:30. Each treatment group was composed of 11 calves. One treatment group continued to receive the unflavored starter (S0) whereas the other group (SF) was switched to the starter supplemented with the same flavor that was added to the MR at the rate of 1.3 g/kg before pelleting (Table 1). The change of starter was applied at this moment rather than at the beginning of the study to allow the assessment of a direct effect of flavor on an hypothetical increase in solid feed consumption during weaning and avoid potential confounding effects due to previous exposure. Calves were completely weaned 7 d after MR was reduced to one daily offer, at 42 d of study, and the experiment was concluded 14 d later.

2.2. Measurements and chemical analyses

Consumption of MR was recorded daily for each calf. Individual starter intake was recorded daily and body weight (BW) weekly. Samples of MR and starter were analysed for DM (24 h at 103 °C), ash (4 h at 550 °C), N content using the AOAC (1990) method (988.05) adapted for an automatic distiller Kjeldhal (Kjeltec Auto 1030 Analyser, Tecator, Sweden) and using $CuSO_4$/Se as a catalyst instead of $CuSO_4/TiO_2$, ether extract following the AOAC method (920.39) using petroleum ether for