Feeding behaviour and metabolic condition of dairy cows during early lactation

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ABSTRACT

In dairy cow the transition period often results in enormous stress and may negatively impact Dry Matter Intake (DMI), milk production and herd health. The aim of this research was to study the feeding behaviour of dairy cows in early lactation and the relationship with the metabolic and health conditions. The trial was carried out on 14 multiparous Italian Friesian cows raised in an experimental free-stall barn. Animals were fed Total Mixed Ratio (TMR) once daily (at 07:30 a.m.) and raised, from 7 to 60 d after calving, in a pen equipped with 24 electronic feeding stations connected to a central computer (Bio Control A/S, Rakkestad, Norway) capable to record individual data on feeding behaviour. The data on feeding behaviour (number of meals, eating time per meal, feed intake per meal and rate of intake) were expressed per day and per day-time (from 07:00 a.m. to 07:00 p.m.) and night-time (from 07:00 p.m. to 07:00 a.m.) period. Cows were bled, before TMR distribution, at -14, -7, 1, 3, 7, 14, and 30 d from calving and samples analyzed for the parameter of the Piacenza Metabolic Profile together to NEFA, BHBA, and creatinine. The BCS was evaluated at -7, 0, 30 and 60 d from calving, while milk yield and body weight were daily recorded. The animals were subdivided in two groups (G and L) according to the Liver Functionality Index (LFI), based on the behaviour of plasma albumin, total cholesterol and bilirubin in early lactation. The results were subjected to ANOVA (Mixed procedure of SAS), including LFI, DIM, period of the day, their interactions, and cow as random effect. During early lactation the behaviour of DMI was mainly related to the eating time per meal and the feed intake per meal; on the contrary, the number of meals per day changed only slightly. The DMI during the day-time period was on average 66% of daily DMI, this proportion did not change significantly during lactation. The animals with lower (worse) LFI (L) compared to the animals with higher (better) LFI (G) have shown: a) lower milk yield (P<0.01); b) lower DMI, mainly as consequence of a lower eating time per meal (25.0 vs. 32.7 min in L and G, respectively; P<0.05) and of a lower feed intake per meal (2.89 vs. 3.82 kg DM in L and G, respectively; P<0.10), despite a greater number of meals per day (6.3 vs. 5.6 meals in L and G respectively; n.s.); c) lower values of plasma albumin and cholesterol, and greater of bilirubin, as consequence of LFI classification, together to greater values of the positive acute phase proteins (AAP+: haptoglobin and ceruloplasmin) before (n.s.) and after calving; d) greater values of plasma NEFA before calving and of NEFA and BHBA after calving; e) some health troubles after calving (mastitis and lameness). In conclusion our data show that feeding behaviour and daily DMI in early lactation was mainly related to the eating time and DMI per meal. An increase of plasma APP+/APP- ratio around calving was associated with a lower DMI in early lactation, together to a reduction of milk yield and a worsening of health condition.
The aim of the research was to evaluate the effect of two different levels of verbascoside on some blood and productive parameters of suckling lambs. The experiment lasted 56 days and was performed on 18 lambs divided into 3 groups, a control group and 2 test groups supplemented with verbascoside as follows:

Control T group of 4 lambs: without verbascoside
Experimental group 1 of 6 lambs: low level of verbascoside; 2.5 ml/kg of live weight
Experimental group 2 of 8 lambs: high level of verbascoside; 5.0 ml/kg of live weight

Verbascoside was daily administrated per os at 9.00 a.m with a particular syringe. Samples during the experiment concerned: live weight and average daily gain, blood sampling, milk’s consumption and the relative index of conversion. Results showed no differences between experimental and control groups for productive performances; even if, for the average daily gain, in the last trial’s period (43-56 d), there was a positive and statistically significant effect (P<0.05) of verbascoside in group 1 (232.1 g) and group 2 (249.3 g) compared to T group (194.6 g). The blood triglycerides concentration was significantly different (P<0.05) between groups; a reduction of blood triglycerides, total cholesterol and bilirubin was also observed in group 2 during the trial. The oxidative status improved in relation of homeostatic plasmatic stability in both levels of verbascoside with a decrease of ROMs and TBARS. The use of verbascoside significantly increased the plasmatic vitamin E concentration in both experimental groups vs. control group, while vitamin A content significantly increased during the trial in group 2. Results show the positive role of nutraceutical supplementation on some blood parameters and on suckling lambs welfare.
Effect of the farrowing crate floor on some behavioural and productive parameters of suckling piglets

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ABSTRACT

The aim of the research was to evaluate the effect of a insulation panel, placed inside the piglets’ area of the farrowing crate, on some productive and behavioural parameters of suckling piglets intensively reared. The trial lasted 3 weeks and was performed on 36 crossbred sows (Large White x Landrace x Duroc) reared with their litters into an intensive pig farm. Sows were placed inside the farrowing crates a week before the litter’s birth day. Two different farrowing crates were tested: a traditional one (TFC) equipped with a slotted floor and an experimental one (EFC) equipped with an insulation panel (made of fiberglass, polystirene and linoleum) placed on the slotted floor of the cage only for the first week from litter’s birth. Gilts were fed into two daily meals and had free access to water nipples. Samples during the trial concerned live weight and average daily gain, weaned/sow piglets, the percentage of piglets’ mortality, the litter’s behaviour only in the first litter’s life week, and air quality inside the farm. Results showed no difference between farrowing crates for litter’s body weight (TFC: 6.27 vs. EFC: 6.53 kg) and daily gain (TFC: 221.2 vs. EFC: 228.2 g/d) and for the number of weaned piglets per sow (TFC: 9.2 and EFC: 8.4). Also the percentage of litter’s mortality was not affected by the treatment (TFC: 20.2 vs. EFC: 19.1%). Litter’s behaviour showed in the first week significant differences (P<0.05) between the two types of farrowing crates for an increase in the sleeping time of piglets on the insulation panel of EFC (11.4%) compared to TFC (4.6%); at d7 an increase in the piglets’ sleeping time under the infrared lamp of TFC was also observed (47.7 vs. 36.8%; P<0.05). Microclimatic parameters were satisfactory to ensure piglets’ welfare in relation to total and respirable dust (respectively, 0.37 and 0.23 mg/m³) and ammonium (5.2ppm). An insulation panel, placed inside the piglets’ area of the farrowing crate, only for the first week of life, did not affect productive performance and did not reduce the percentage of mortality but fostered only a greater distribution of piglets on the insulation panel rather than under the infrared lamp.
Effect of diet supplementation with viable and dead yeasts on sheep faecal microflora

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ABSTRACT

It is known that probiotic and prebiotic diet supplementation may produce variations in human and animal intestinal tract microflora composition. The aim of this study was to investigate the effects of live and dead cells of *Saccharomyces cerevisiae* dietary supplementation on dairy sheep faecal microflora. Forty-eight lactating Sarda ewes were divided into 4 treatments groups, each consisting of 12 animals. From February to April, the ewes were allowed to graze for 4 hours daily *Lolium multiflorum* receiving as supplement 300 g/d of lucerne hay and 900 g/d of pelleted concentrated divided in three meals. The yeasts, which had been thoroughly mixed with concentrate ingredients, were administrated as follows: 1 g/head/day of probiotic supplement (Levucell SC10 ME), corresponding to 1×10¹⁰ cfu/day live cells of *S. cerevisiae* (group PRO); 10 g/head/day of prebiotic supplement Ferment Biolife containing inactive dried yeast from sugar cane (group PRE); 1 g/head/day of Levucell SC10 ME plus 10 g/head/day of Ferment Biolife (group MIX). A control group (group CON) received the same concentrate supplementation as above but with no yeast addition. Within each group, the animals were divided in 3 subgroups of 4 animals and 3 homogeneous samples of faeces per group were analysed. Before starting the differentiated diet and during it, sheep intestinal microflora was monthly assessed in faeces for the viable counts of: total mesophilic microflora, yeast and moulds, mesophilic lactobacilli, *E. coli* and coliform bacteria. Sporogenous lactate-fermenting bacteria were also determined as MPN/g of faeces. Probiotic and prebiotic supplements were also analyzed to assess live yeasts cells. The microbiological pre-experimental analyses showed that live yeast cells were already present in faeces of all the animal groups and also in prebiotic supplement (1x10³ cfu/g). No significant differences were found in the faecal microflora of the animals before starting the trial. After three weeks of differentiated diet, yeasts counts increased in the treated groups (1 log in group PRE and 2 log in groups PRO and MIX) and decreased in the group CON (1 log). After 8 weeks of differentiated diet, yeasts counts decreased in all groups except for the MIX one, where they remained constant. Nevertheless, differences in yeasts viable counts were not significant. After 3 weeks of treatment, mesophilic lactobacilli significantly (P<0.05) increased only in group PRE, while after 8 weeks of differentiated diet *E. coli* cells decreased (P<0.05) only in group PRO. No significant variations in viable counts of the other assessed microbial groups were pointed out depending on the treated and/or the control groups. Further investigations would be needed to confirm that the diet supplementation adopted in this study can affect the natural balance of dairy sheep intestinal microflora.

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Flaxseed supplementation can sustain immune function of cows in hot environment

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ABSTRACT

Environmental and nutritional factors such as ambient temperature and diet have been implicated in alterations in immune function. The effects of two different fat supplementations on immune functions of dairy cows under high ambient temperatures were determined. The experiment was performed from June to September and involved 24 Italian Friesian cows, divided into 3 groups of 8 animals, which were subjected to fat supplementations based on whole flaxseed (FS) or microencapsulated fish oil (FO). Daily the air temperature and the relative humidity were monitored using thermo-hygrographs. At d 0, 45, and 90 of the experiment, lymphocyte response to phytohemagglutinin (PHA) was determined in vivo on each animal by measurement of skin-fold thickness at site of PHA injection. A humoral response to chicken egg albumin (OVA) was established following a subcutaneous injection with OVA. To assess their immune responses plasma was prepared from experimental blood samples taken at 0, 15, 30, 45, 60, 75 and 90 days of the experiment. Plasma samples were measured for the presence anti-OVA IgG, and for the concentrations of Interleukin-1β, IL-6 and IL-10. Data were processed by analysis of variance, using the GLM procedure of SAS. Results revealed greater skin-fold thickness, corresponding to higher mean lymphocyte proliferation, following in vivo PHA injection in cows fed FS compared to the FO or the control groups. Cows fed FS displayed higher titres of anti-OVA IgG than either the control and FO fed cows (P<0.05). No effects of the diet on IL-1β or IL-6 concentrations were found, whereas IL-10 secretion was lower in FS fed cows than in control cows (P<0.05). The present study demonstrates that flaxseed supplementation can enhance immune responses of dairy cows exposed to high ambient temperatures.
A non invasive method to measure the lameness in dairy cows

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ABSTRACT

Given the strong negative economic impact that lameness has on the welfare cows and on the profitability of the herds of dairy cows, the possibility to early detect podalic diseases is an essential tool for improving both animal’s welfare and the farm economy. Indeed, the early care of them provides an higher recovery rate. Thermography is a non-invasive technique that may be used to remotely assess skin temperature at distance, without interferences with animals and their behaviour. Aim of this research was to verify the possibility of using thermography technique as a diagnostic tool to early detect the foot pathologies. In this work we used a thermocamera AVIO TVS 500, which is a very sensitive tool, but also portable and rugged enough device to be used within a farm. Six experimental sessions were conducted on 130 dairy cows of different age and stage of lactation, in five dairy cows farms in the north of Italy (temperature from 10°C to 30°C). Animals were gathered in the waiting room before milking and subjected to thermographic measures. The thermographic technician, always the same person, located in the middle of the animals, observed each foot from different positions and at a distance not exceeding two meters. Thus he scored each foot on three levels: healthy, sick or doubt. recording at least one thermographic image for each foot seen. After that, the veterinarian made the diagnosis, checking if the disease was actually present on each foot, without knowing the opinion of the technician. Correspondence between the thermographic measurements and the veterinary surgeon’s diagnosis was statistically verified. Due to the fact that thermographic analysis should be an investigation with preventive value, it was decided to classify doubt cases as sick ones. Results were as follows: sensitivity 93% and specificity 38% for back limbs, 50% sensitivity and specificity 93% for the fore ones. Further research is needed to verify the presence of positive cases at thermographic analysis, but for which the veterinarian did not find evident pathologies, more on back limbs. This fact could be due to uncorrected postures or subclinical diseases; in fact, these are the most stressed limbs, because of the breast weight, and the veterinarian has found most of the diseases on them. Moreover, the thermocamera found that they are almost always warmer than the fore ones. This fact, in addition to the low number of diseases present in the fore limbs could explain the poor results obtained for them. Next steps will be to obtain further measures enlarging the database and trying to standardize the methodology; we are also following some cases positive only at thermography measure, in order to monitor their evolution over time.
The aim of the present study was to evaluate the weaning effect on the total antiradicalic activity in piglets. At weaning (24 day), forty castrated male piglets of an average live weight of 7.1 ± 0.8 kg, were randomly selected, moved to a pens (10 piglets per pen) and reared in an environmentally controlled room. Fasting blood samples were taken by all the subjects by anterior vena cava puncture at: weaning (T0), and at 15 (T1) and 60 (T2) days after weaning. The blood samples were immediately analyzed for the determination of the total antiradicalic activity, using the KRL biological test. Whole blood and red blood cells solutions were incubated at 37°C for 15 min before being submitted to free radicals produced by a final 50mM solution of AAPH. Haemolysis was recorded using a 96-well microplate reader by measuring the optical density decay at 450 nm (Laboratoires Spiral, France). Results, expressed as the time that is required to reach 50% of maximal haemolysis (half-haemolysis time, HT50 in minutes) which refers to the erythrocyte resistance to free radical attack. A mixed model ANOVA was used to assess the main effect of time and a random effect of animal on whole blood and red blood cells total antioxidant activity. The half-haemolysis time of whole blood declined (P<0.001) from 102.8 ± 9.8 min in nursing piglets of 24 days to 86.4 ± 7.5 min and 73.4 ± 6.5 min at 15 and 60 days after weaning respectively. The same result was observed for the half-haemolysis time of red blood cells that decreased (P<0.001) from 70.4 ± 9.8 min in nursing piglets of 24 days, to 59 ± 4.4 min and 53.5 ± 4.8 min at 15 and 60 days after weaning respectively. Overall these result indicate that total antioxidant activity in piglets blood significantly decline after weaning. This gives clear evidence that dietary antioxidant supplementation after weaning may positively affect the antioxidant status improving pig health.

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Homeopathic treatments during early lactation in Buffalo cows

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Abstract

It has been tested, in a buffalo organic farm, the effect of the administration of homeopathic detoxicating, immune-stimulating and production-stimulating remedies in the peri-partum. The trial has been leading on thirty buffalo cows subdivided into three groups homogeneous for parity and lactation days. In the immediate pre-calving, 2.5 ml/d per head for about 20 days, of Echinacea Purpurea were orally administered to the first group (A) and, immediately after calving, subsequent to the mechanic milking, Nux vomica 30 CH, Chelidonium 30 CH and Lycopodium 30 CH were also administered at a distance of 7 days from one to the other. The second group (B) was only subjected to the post-calving treatment, while the third group (C) represented the control group. The milk production was higher in the group A than in group B and C (10.04 vs 8.20 and 8.95 kg, respectively, P<0.01). In our experimental conditions, remedies administration in the post-calving period did not affect milk protein and lipid contents, even though the group B showed values of fat always higher than C group (8.57 vs 8.02%, respectively). No significant difference was found on the achievement of the peak of lactation between the 3 groups, even if the group A showed a greater persistence of the peak phase. Analysis of blood samples, taken at 0, 14 and 21 days after calving showed that total protein, albumin and globulin levels were lower in groups A+B treated, compared to group C in T0 and T21 (44.70 vs 53.65, 25.03 vs 28.00; 22.00 vs 25.54 g/l in T0 respectively; 58.90 vs 62.26; 29.40 vs 31.15; 30.30 vs 31.11 g/l in T21 respectively). Only in T14 the treated groups showed higher values for considered parameters (60.21 vs 49.53; 30.95 vs 26.25; 29.15 vs 23.27 g/l, respectively). Only for the total protein content the difference between groups was significant (P<0.01). Cholesterol in T0 (1.79 vs 2.20 mmol/l) was lower in the treated groups than the control one. Urea value was lower in the treated groups than the control one in T21 (8.61 vs 9.37, mmol/l P<0.01). We can conclude, therefore, that the use of homeopathic remedies are not only a therapeutic weapon, but also a chance to improve animal welfare and their productive characteristics.