Ruminant Nutrition: Dairy calves

149 Effects of intensive whole-milk feeding in calves on

subsequent growth of dairy heifers. Camila Flávia de Assis Lage¹, Mariana Magalhães Campos², Fernanda Samarini Machado², Paulo Campos Martins¹, Luigi Francis Lima Cavalcanti^{*3}, Marcelo Neves Ribas³, Luiz Gustavo Ribeiro Pereira², Thierry Ribeiro Tomich², Rafael Alves de Azevedo¹, and Sandra Gesteira Coelho¹, ¹Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil, ²EMBRAPA Dairy Cattle, Coronel Pacheco, Minas Gerais, Brazil, ³CNPq, RHAE – SEVA Engenharia, Projeto Intergado, Contagem, Minas Gerais, Brazil.

The effects of intensive whole milk feeding in calves on subsequent growth of Holstein-Gyr females was evaluated. Up to 56 d old, calves received 6 L/d of 4 different liquid diets consisting of whole milk with increasing addition of milk replacer (Sprayfo Violet SSP) to adjust the concentration of total solids (TS) to 13.5 (n = 15), 16.1 (n = 15), 18.2 (n = 15), = 13), 20.4% (n = 15). After weaning, animals were randomly housed in 4 paddocks, each one equipped with electronic feed and water bins (Intergado, Brazil) in Embrapa Dairy Cattle facilities, Brazil. Diet (70:30, corn silage:concentrate, 195 g CP/kg, DM basis) was fed ad libitum, twice a day, until 210 d old. The withers height (WH), hip height (HH), rump width (RW) and chest circumference (CC) measures were carried out fortnightly using a flexible tape measure and a teletape (Ketchum, Canada). WH and CC were analyzed as a completely randomized design with repeated measures using nonlinear mixed models approach. A regression model $(Y(age) = A + (B - A) exp[-exp(-c \times age)], where Y$ = response at a specific age, A = asymptote as age $\rightarrow \infty$, B = Y₍₀₎, and c = logarithm of the rate constant) was fit to the data, where age and function parameters were allocated as fixed effects while animal was considered as random. It was evaluated the necessity of adding random terms to model error dependence and heteroscedasticity by monitoring Schwarz criterion, estimates stability and correlation. HH and RW, due to their linear growth pattern, were analyzed by linear mixed models, allowing polynomial models of first and second degree orders to model variable change over time ($\alpha = 0.05$). All variables were steadily influenced by age, but only WH and CC were influenced by TS. For both responses, the c parameter was linearly increased by TS, revealing that a more intensive feeding strategy increases the growth rate of these 2 traits. TS influenced all CC parameters, where increasing total solid level caused a linear decrease of A, while increased B. TS effects over parameters A and B should be interpreted with parsimony, because animals in the present study had not achieved their mature weight.

Key Words: milk replacer, intensive farming, heifer

150 Effect of bacteria level in colostrum on dairy heifer serum IgG concentration. Christine Cummins and Emer Kennedy*, *Teagasc, Ireland.*

Storage of colostrum >4°C increases total bacterial count (TBC) which may compromise passive transfer of immunity. This experiment investigated the effect of colostrum stored at varying temperatures, to induce a difference in bacteria levels, on the rate of passive transfer of immunoglobulin G (IgG) in dairy heifer calves. Colostrum was collected immediately postpartum from Holstein-Friesian (HF) cows, tested for IgG concentration, and assigned to 1 of 5 treatments: (1) pasteurized, (2) fed when freshly collected, (3) stored at 4°C for ≥48 h (fridge), (4) stored at 13°C ≥48 h, and (5) stored at 22°C ≥48 h. Colostrum fed to each calf was tested for TBC, using serial dilution and IgG concentration

using radial immunodiffusion (RID; Triple J Farms, WA). Seventyfive HF and HF × Jersey (JEX) heifer calves were removed from their dam and assigned to a treatment immediately postpartum at Teagasc Moorepark Research Farm, from 3 Feb to 25 Mar 2014. A randomized block design accounting for breed, birth date and birth weight (BW) was used. Calves were fed 8.5% of their BW in colostrum via stomach tube within 2 h. Calf blood samples were collected at 0 and 24 h of age and analyzed for IgG concentration using RID. Data were checked for normality and the MIXED procedure in SAS was used to examine the effect of treatment on serum IgG concentration. Pasteurised colostrum had a TBC <9,000 cfu/mL, fresh colostrum had 68,000 cfu/mL; both below the recommended level of 100,000 cfu/mL. Colostrum stored at 4°C had a TBC > 2 million cfu/mL, currently not recommended for feeding. Colostrum stored at 13°C and 22°C had significantly higher (P < 0.01) TBCs (>92 and >1000 million cfu/mL, respectively). Colostrum stored at 22°C had the lowest IgG concentration (62 g/L). The overall average colostrum IgG concentration across all treatments was 97 g/L. Zero-hour serum contained no IgG. Serum IgG of calves at 24 h from the pasteurised, fresh and 4°C treatments were similar, but were significantly higher (P < 0.05) than colostrum from the 13°C and 22°C treatments. Colostrum with high levels of bacteria reduced IgG absorption in dairy calves. Colostrum should be stored $\leq 4^{\circ}$ C to minimize bacterial growth and improve subsequent passive transfer of IgG.

Key Words: calf, IgG, colostrum

151 Performance of calf reared on waste milk or nonmedicated milk replacer contained sodium butyrate and *Bacillus*

amyloliquefaciens. O. V. Vazquez-Mendoza¹, A. E. Kholif², M. M. Y. Elghandour³, A. Z. M. Salem^{*3}, V. L. Garcia-Flor⁴, and T. A. Morsy², ¹Norel México S.A. de C.V., Parque Industrial El Marqués, Querétaro, México, ²Dairy Science Department, National Research Centre, Giza, Egypt, ³Facultad de Medicina Veterinaria y Zootecnia, Universidad Autónoma del Estado de México, Toluca, Estado de México, Mexico, ⁴Centro de Ciencias Agropecuarias, Universidad Autónoma de Aguascalientes, Aguascalientes, México.

More interest is paid for the accelerated growth programs for dairy calves through enhancing early nutrition programs based on greater rates of liquid feeding for better mammary gland development and milk production. Appropriate supply of nutrients for calves through liquid feed including milk or milk replacer is essential for better performance and welfare. In a completely randomized design, the nutritional and economic efficiencies, and growth performance of 18 Holstein female dairy calves (41 ± 3.7 kg BW, 1 d old) fed either pasteurized waste milk (PWM) or calf milk replacer (CMR) were tested. Calves were fed colostrum (IgG; 70-100 mg/mL) within the first 2 h of life at the rate of 10% of their BW, and then offered 2 L every 12 h for 3 d, without access to solid feed. Calves were fed individually on PWM (n = 9) or CMR containing Bacillus amyloliquefaciens and sodium butyrate (n = 9) twice daily at 0900 and 1600 h for 60 d. From the fourth day, calves were offered pelleted starter feed (180 g CP and 338.2 g of NDF/kg DM) in the morning at 0900 h. Water was provided ad libitum. Health condition, body measurements, fecal bacteriological analysis and economic analysis were measured. No differences were observed for liquids and total starter intakes; however, calves fed on PWM consumed more (P < 0.05) starter DM during the period from d-16 to d-45 with greater metabolizable energy intake. Greater (P < 0.05) BW changes