

before parturition is able to induce the proliferation of ruminal epithelium, but some experiments have found conflicting results raising questions about the effectiveness of transition diet. The aim of this study was to examine whether transition diet given in the last weeks of gestation could contribute effectively to the control of RA in the postpartum of dairy cows. Six Holstein cows with cannula in the dorsal sac of the rumen, were allocated to 2 treatments in 3 blocks of 2 cows, defined by the date of the expected parturition. Six weeks before the expected calving, cows were fed a standard diet and 4 weeks before delivery were subjected to diets with high (HGC) or low (LGC) grain content. After delivery, all cows were fed a high energy lactation diet. Fragments of the rumen were collected by biopsy on days -42, -28, -14, -7, 2, 14, 28, 42 and 56 in relation to parturition. Cows that were fed HGC diet had higher ( $P < 0.01$ ) dry matter intake and higher ( $P < 0.01$ ) milk production. The HGC diet induced greater ( $P < 0.01$ ) extension of the rumen absorptive surface than LGC diet. This supports the hypothesis that transition diet improves the ruminal ability to absorb VFA. The extent of the absorptive surface before parturition was lower than after calving, probably reflecting the effect of the highly energetic lactation diet. The provision of HGC diet before parturition may be a good alternative for the RA control after calving of dairy cows. This practice induces further development of the absorptive surface of the rumen avoiding the accumulation of VFA in this compartment. The greater dry matter intake and the greater milk production associated to HGC diet appear to have been a reflection of better physiological conditions of the rumen of these animals.

**Key words:** acidosis, ruminant stomach, transition diet

**W343 Energy efficiency and performance of lactating dairy cows fed ethanol and acetic acid.** J. L. P. Daniel\*, L. G. Nussio, R. C. Amaral, A. Sá Neto, E. H. C. Garcia, A. W. Bispo, F. C. L. Oliveira, and I. F. Silva, *University of Sao Paulo, College of Agriculture "Luiz de Queiroz", Piracicaba, SP, Brazil.*

Ethanol and acetic acid are common end products from silages. The objective of this study was to determine whether ethanol and acetic acid affect performance and energy efficiency of high producing dairy cows. Heat of combustion from ethanol (kcal/g) is higher than either acetic acid or glucose, thus ethanol fed animals could be more efficient. Thirty lactating Holstein cows were grouped in 10 blocks and fed either: Control (33% Bermuda hay + 67% concentrates); Ethanol (control diet + 5% ethanol); or Acetic acid (control diet + 5% acetic acid, DM basis) diets, during 7 weeks. Ethanol and acetic acid were diluted in water (1:2) and sprayed onto total mixed ration twice daily before feeding. The same amount of solution was replaced with water in the control diet. During the 1st week the cows received half-dose of these chemical compounds. Dry matter intake (DMI) and milk yield were recorded every day and milk composition was determined once weekly. Data were analyzed as repeated measures using the MIXED procedure of SAS. Cows fed ethanol yielded more milk (37.9 kg/d) than those fed control (35.8 kg/d) or the acetic acid (35.3 kg/d) diets ( $P = 0.04$ ), due to the higher DMI (23.7, 22.2, 21.6 kg/d, respectively). The significant diet\*week interaction for DMI ( $P = 0.02$ ), mainly during the 2nd and 3rd weeks (when the 5% acetic acid achieved the full dose) was related to the decrease in DMI of the acetic acid diet. Milk fat yield, milk urea-nitrogen and somatic cells counts were unaffected by diets, however protein and lactose yields were higher for ethanol diet, which agrees with the higher milk yield. Energy efficiency showed diet\*week interaction ( $P = 0.06$ ) and again, during 2nd and 3rd weeks the acetic acid diet increased NEI milk/DMI ratio due to the lower DMI and body weight loss. Otherwise, energy efficiency was

similar across diets (1.1 Mcal NEI milk/kg DMI). Animal performance suggested similar energetic value from ethanol containing diet as compared with the other diets. Volatilization losses of ethanol at feed bunk and rumen conversion to acetate might be reasonable explanations to the deviation on the predicted energetic value.

**Key words:** volatile organic compounds, alcohol, intake

**W344 Effect of an essential oil compound based product on ruminal disappearance of proteins, fiber and starch and fermentation parameters in dairy cow.** D. Éclache, P. Etienne, and V. Noiro\*, *Phodé Laboratoires, Terssac, France.*

An in vivo study was carried out to evaluate the effect of Oleobiotec (Phodé Laboratoires, France) containing carvacrol on ruminal disappearance of crude proteins-CP (soybean meal), starch (corn meal), fiber (alfalfa hay) and rumen fermentation parameters. Four non lactating dairy cows with ruminal cannulas were assigned to a  $2 \times 2$  factorial arrangement in a  $4 \times 4$  Latin square design. The product was given orally (0 or 1g/cow/day) and tested on 2 types of diet: one concentrated in fiber (F diet: 42% NDF, 20% starch) and the other in starch (S diet: 42% starch, 27% NDF). The ruminal disappearance of starch, CP and fiber was measured by the nylon bag method, after 4, 8 and 24 h, respectively. Each experimental period lasted 35 d with 15 d for adaptation, 12 d for the treatment and measures and 8 d without additive. A mixed linear model was used for statistical treatment (SPSS). Oleobiotec increased ADF disappearance with the S diet (+6.1 pts,  $P < 0.05$ ) and decreased CP disappearance when associated with F diet (-6.0 pts,  $P < 0.05$ ). There was no significant effect on starch disappearance and total volatile fatty acids concentration on either diet. The proportion of acetate increased with the S diet ( $P < 0.05$ ) and that of propionate tended to increase with the F diet and to decrease with the S diet ( $P < 0.10$ ). N-NH<sub>3</sub> concentration decreased with the S diet ( $P < 0.05$ ). Oleobiotec seems to improve fiber utilization with high starch diet and lower CP rumen utilization with high fiber diet.

**Table 1.**

	F		S		SEM
	Control	Oleobiotec	Control	Oleobiotec	
Disappearance, %					
ADF	28.2 <sup>c</sup>	28.0 <sup>c</sup>	19.3 <sup>a</sup>	25.4 <sup>b</sup>	1.6
CP	40.1 <sup>c</sup>	34.1 <sup>a</sup>	36.1 <sup>b</sup>	37.3 <sup>b</sup>	2.2
Starch	50.7	50.5	51.1	51.2	2.3
Fermentation parameters					
Total VFA, mmol	80.2 <sup>a</sup>	82.2 <sup>a</sup>	97.5 <sup>b</sup>	100.8 <sup>b</sup>	2.4
Acetate, %	70.2 <sup>c</sup>	70.2 <sup>c</sup>	63.9 <sup>a</sup>	65.7 <sup>b</sup>	0.5
Propionate, %	15.9 <sup>x</sup>	16.5 <sup>y</sup>	17.8 <sup>z</sup>	16.9 <sup>y</sup>	0.3
N-NH <sub>3</sub> , mg/L	166.1 <sup>a</sup>	160.1 <sup>a</sup>	272.7 <sup>c</sup>	223.0 <sup>b</sup>	16.7

<sup>a-c</sup>Within a row means without a common superscript letter differ,  $P < 0.05$ ; <sup>x-z</sup> $P < 0.10$ .

**Key words:** essential oil, dairy cow, rumen

**W345 Milk fatty acid profile from dairy cows fed tropical forage-based TMR containing increasing levels of sunflower oil.** M. A. S. Gama\*, C. G. S. Ribeiro<sup>4</sup>, F. C. F. Lopes<sup>1</sup>, M. M. Almeida<sup>2</sup>, E. F. Motta<sup>1</sup>, M. T. Ribeiro<sup>1</sup>, and J. M. Griinari<sup>3</sup>, <sup>1</sup>Brazilian Agricultural Research Corporation, Juiz de Fora, Minas Gerais, Brazil, <sup>2</sup>The Uni-

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Due to health concerns associated with milk fat intakes, efforts have been made to decrease medium chain saturated fatty acids (C12 to C16) and increase oleic acid (cis-9 C18:1) as well as CLA (cis-9 trans-11 C18:2) in milk fat. Supplementation of the dairy cow diet with plant oils is a practical way to achieve this goal. Most studies published, thus far, have used temperate grasses or corn silage as forage. In this study, we evaluated the effects of increasing levels of sunflower oil (SO) on milk fatty acid profile in cows fed fresh Elephant grass (*Pennisetum purpureum*) - a tropical forage. Twelve primiparous Holstein cows (95 ± 25 DIM) were assigned to the following dietary treatments (level of SO inclusion, % of diet DM): Control (CTL): 0%; T1: 1.5%, T2: 3.0% and T3: 4.5%. The experimental design was a 4 × 4 Latin Square with 15 d treatment periods (last 5 d for data collection). Diet was fed as a TMR and it was composed of chopped Elephant grass and a concentrate mixture (65:35, DM basis) containing the SO. Milk yield, milk composition and DM intake were unaffected by the treatments. SO supplementation reduced the relative proportion of C12:0 to C16:0 fatty acids from 42.2% to 38.8, 27.8 and 26.8% for CTL, T1, T2 and T3, respectively ( $P < 0.05$ ). C18:0 increased from 9.9% to 14.3, 15.7 and 16.7% ( $P = 0.006$ ), cis-9 C18:1 increased from 21.7% to 24.8, 26.7 and 27.3% ( $P = 0.0315$ ) and cis-9 trans-11 CLA increased from 0.88% to 1.26, 1.62 and 2.14% ( $P < 0.0001$ ) for CTL, T1, T2 and T3, respectively. Interestingly, there was a linear decrease ( $P < 0.05$ ) in desaturase indexes (14:1/14:0, 16:1/16:0, 18:1/18:0 and CLA/trans-11 C18:1) as the level of dietary SO increased. Concentration of C18:0 in milk fat was inversely associated with C18:1/C18:0 and CLA/trans-11 C18:1 ( $r = -0.85$ ,  $P < 0.0001$ ), and with C14:1/C14:0 ( $r = -0.69$ ,  $P < 0.0001$ ). These results suggest that extensive biohydrogenation of dietary PUFA has occurred in the rumen, leading to high levels of C18:0 in milk fat. High level of C18:0 in the preformed fatty acid supply to the mammary gland may have contributed to the observed reduction in desaturase indexes.

**Key words:** desaturase, milk fat, cows

**W346 Effects of grinding or steam rolling of starter grains on nutrient digestibility of Holstein suckling calves.** N. Jalali-Farahani, M. Dehghan-Banadaky\*, K. Rezayazdi, and M. Ganjkanlou, *Animal Science Department, Campus of Agriculture and Natural Resources, University of Tehran, Karaj, Tehran, Iran.*

This study conducted to evaluate the effects of grains processing (grinding versus steam rolling) in calf starter diet on nutrient digestibility of Holstein suckling calves. In present experiment, 60 Holstein calves (28 male and 32 female) with average 44 ± 5 kg birth weight were used from 3 until 120 d old. Calves randomly divided to 4 treatments included: 1) ground barley and corn, 2) steam rolled barley and ground corn, 3) ground barley and steam rolled corn, 4) steam rolled barley and corn. Calves were housed in individual hutch and had free access to water and starter diet. Calves weaned at 90 d old. In this experiment a complete blocks randomized design used with 4 treatment (diets) and 15 replicates (calves) and 2 blocks (sex). Feed and fecal were sampled at 90 and 120 d. Acid insoluble ash used as internal markers for nutrients digestibility study. Manure screening was done every other week for evaluation of grain digestion. In diet 1, undigested grain in fecal was significantly different from others treatments ( $P < 0.05$ ). Apparent digestibility of dry matter, crude protein, neutral detergent fiber, organic matter, and ether extract between diets had not

significant discrepancy. But apparent digestibility of non fibrous carbohydrates (NFC) was significantly different between treatments ( $P < 0.05$ ). The results indicated that the treatment with grinding corn and grinding barley did the best performance for starter diet in Holstein calves.

**Key words:** calf starter, grinding, steam rolling

**W347 Investigation of grinding or steam rolling of starter grains on growth performance of Holstein suckling calves.** N. Jalali-Farahani, M. Dehghan-Banadaky\*, K. Rezayazdi, and M. Ganjkanlou, *Animal Science Department, Campus of Agriculture and Natural Resources, University of Tehran, Karaj, Tehran, Iran.*

This study conducted to evaluate the effects of grains processing (grinding versus steam rolling) in starter diet on growth performance of Holstein suckling calves. In present experiment, 60 Holstein calves (28 male and 32 female) with average 44 ± 5 kg birth weight were used from 3 until 120 d old. Calves randomly divided to 4 treatments include: 1) ground barley and corn, 2) steam rolled barley and ground corn, 3) ground barley and steam rolled corn, 4) steam rolled barley and corn. Calves were housed in individual hutch and had free access to water and starter diet. Calves weaned at 90 d old. In this experiment a block completely randomized design used with 4 treatment (diets) and 15 replicates (calves) and 2 blocks (sex). Measurements of shoulder height, hip width and hip height were recorded every 15 d. In diet 1, hip height and shoulder height were significantly more than other treatments ( $P < 0.05$ ). Width hip between diets did not show any significant difference but hip width was a significant difference between sexes, female calves had wide hip. Results indicate that the type of grain processing incorporated into calf starter can influence structural growth in suckling calves.

**Table 1.** Least squares means for structural growth measurements of Holstein calves fed for diet 1-4

	Diets				SEM	Sex		P-value	
	1	2	3	4		male	female	sex	treatment
Shoulder Height (cm)	89.9	86.1	88.3	87.8	1.16	88.5	87.6	NS	NS
Hip Height (cm)	92.8 <sup>a</sup>	90.6 <sup>ab</sup>	91.1 <sup>ab</sup>	89.3 <sup>b</sup>	1.01	90.4	90.0	NS	0.03
Hip Width (cm)	13.4	13.2	14.8	13.6	0.56	13.0 <sup>b</sup>	14.5 <sup>a</sup>	0.01	NS

Diets 1-4 included: 1) ground barley and corn, 2) steam rolled barley and ground corn, 3) ground barley and steam rolled corn, 4) steam rolled barley and corn.

**Key words:** grinding, steam rolling, calf starter

**W348 Investigation of chewing activity in cows fed diet with different ratios of alfalfa hay and corn silage.** A. Akbai, A. Zali, M. Ganjkanlou, and M. Dehghan-Banadaky\*, *Animal Science Department, Campus of Agriculture and Natural Resources, University of Tehran, Karaj, Tehran, Iran.*

In present study, chewing activity in cows fed total mixed ration based on alfalfa hay and corn silage evaluated. Fifteen Holstein cows (37 ± 10 DIM) were used in a completely randomized design with 3 treatments and 5 replicates during 9 weeks. Treatments included 3 levels of