T202 Effect of supplementation with sunflower oil (SO) or seeds (SS) combined or not with fish oil (FO) on conjugated linoleic acid (CLA) in milk from grazing dairy cows. G. A. Gagliostro*[1], M. A. Rodríguez[2], P. Pellegrini[2], P. Gatti[2], G. Muset[2], D. Garciarena[1], A. Ferlay[3], and Y. Chilliard[3], [1]*Instituto Nacional de Tecnología Agropecuaria, INTA*, *Balcarce, Buenos Aires, Argentina*, [2]*Instituto Nacional de Tecnología Industrial, INTI*, *Buenos Aires, Argentina*, [3]*Institut National de la Recherche Agronomique, INRA*, *Saint Genès Champanelle, France*.

The effectiveness of C18:2-rich supplements (SS vs SO) combined or not with FO to increase milk CLA (cis-9, trans-11C18:2) was evaluated in 64 Holstein grazing cows. During each milking corn grain (1.3 kg DM/cow) and a mineral-vitamin mix (0.25 kg) were consumed. Between the a.m. and p.m. milkings cows grazed a pasture at 11 kg DM/cow allowance. After the p.m. milking, cows (16/treatment) received four TMR diets over a 5-wk period : 1) SS = 74.7% corn silage (CS); 25.3% SS, 2) SO = 76.7% CS, 12.3 % sunflower meal (SM), 11 % SO; 3) SS-FO = 72.4 % CS, 24.5 % SS, 3.1 % FO and 4) SO-FO = 74.3% CS, 11.9% SM, 10.6% SO, 3.2% FO. TMR intake (kg DM) averaged 7.52, 7.33, 3.45 and 4.63. Every week milk samples were collected and FA composition (GLC) were analyzed in a completely randomized design with repeated measures. A pre-trial period represented basal FA concentrations and used for covariance analysis. The average 5-wk concentrations (g/100g FA) of C12:0 (1.52) and C14:0 (6.39) were similar. Concentration of C16:0 was higher (P<0.01) when FO was included in the diet (20.49 vs 17.94). FO supply reduced (P<0.01) milk content of C18:0 (13.54 to 6.30) and cis-9 C18:1 (31.39 vs 19.2) and increased total trans-C18:1 (21.8 vs 10.56). Interactions (P<0.05) between sources of C18:2n6 (SS and SO) and FO were detected for C18:2n-6 and CLA . Concentration of C18:2n-6 was: SS (2.78), > SS-FO (2.10), >SO (2.04), >SO-FO (1.73). Concentration of C18:3n-3 was higher (P<0.03) with treatments including FO (0.68 vs 0.62). Pre-trial CLA concentrations averaged 1.08, 1.15, 1.12, and 1.11 for SS-FO, SS, SO-FO and SO respectively. Milk CLA content was sharply increased after lipid supplementation reaching a maximal value of 8.49 g/100g FA (± 2.25) at wk-5 in SS-FO. The highest average CLA concentration over the 5-wk was observed in SS-FO (6.07) followed by SO-FO (4.37), SS (2.96) and SO (2.36) treatments. Mixing lipid supplements with corn silage represents a feeding-strategy that may be easily carried out by the farmer in order to improve milk CLA and trans-C18:1 concentrations.

Key Words: Conjugated Linoleic Acid, Sunflower, Fish Oil

T203 Effect of dietary vegetable oil and antioxidant supplementation on dairy cattle performance and milk fat depression. M. He[1], H. S. Xin[2] and L. E. Armentano[1], [1]*University of Wisconsin, Madison,* [2]*China Agricultural University, Beijing, China.*

This experiment was conducted to evaluate the effect of dietary supplementation of free vegetable oil with or without a commercial antioxidant (Agrado® plus, Novus International) on dairy cattle performance and milk fat depression. Twenty four multiparous Holstein cows (138±31 DIM) were divided by production into 2 blocks (Hi or Lo) of 12 cows each. Agrado (0 or 0.025% of DM, -A or +A) was randomly assigned to 6 cows per block resulting in a main plot randomized block design with 20 df for error. These 4 groups of 6 cows each (-AHi, -ALo, +AHi and +ALo) were each fed 6 diets in a 6X6 Latin square design that was a split plot with 3wk periods. Dietary treatments were no added oil (CTRL), or 5% DM as free oil from palm (PALM), high-oleic safflower (OSAF), high-linoleic safflower (LSAF), linseed (LNSD) or corn oil (CORN). Diets were formulated to be iso-CP and iso-NDF, and consisted of approximately 40% alfalfa silage, 20% corn silage and 40% grain mix (DM basis). Data reported were analyzed using the mixed model of SAS (Y = agrado + block + block*agrado + oil + oil*agrado + oil*block + period + period*agrado + period*block). There was no main effect of Agrado feeding nor an Agrado by oil interaction for milk production parameters, but Agrado by block interaction was found for milk yield (P=0.09) and milk protein yield (P=0.08). Negative effects were associated only with the unsaturated fatty acids and linoleic acid appeared to be the most deleterious of the unsaturated fatty acids fed.

Table 1. Effect of vegetable oil on dairy cattle performance

	CTRL	PALM	OSAF	LSAF	LNSD	CORN	SEM
DMI, kg/d	22.44^{ab}	22.97^{ab}	24.80^{a}	22.97^{ab}	23.27^{ab}	21.13^{b}	0.99
Milk, kg/d	33.5^{ab}	34.5^{a}	33.7^{a}	30.5^{b}	33.6^{ab}	32.2^{ab}	1.33
Milk Fat %	3.41^{a}	3.43^{a}	3.04^{b}	2.85^{b}	3.07^{b}	3.05^{b}	0.11
Milk Protein %	3.24^{b}	3.24^{b}	3.30^{ab}	3.45^{a}	3.28^{b}	3.39^{ab}	0.06
Milk Fat, kg/d	1.14^{ab}	1.18^{a}	1.02^{bc}	0.86^{d}	1.02^{bc}	0.98^{cd}	0.05
Milk Protein, kg/d	1.09^{a}	1.10^{a}	1.10^{a}	1.03^{a}	1.08^{a}	1.08^{a}	0.04

[ab]Least square means within a row not sharing a common superscript differ (P<0.05). Based on Bonferroni statistical test.

Key Words: Vegetable oil, Antioxidant, Milk fat depression

T204 Effect of close-up fat supplementation on first 90 days milk production of Holstein dairy cows. M. Danesh Mesgaran* and A. R. Heravi Mousavi, *Dept. of Animal Science (Excellence Center for Animal Science), Ferdowsi University of Mashhad*, *Mashhad, Iran*.

Effect of close-up fat supplementation and body condition score on first 90 days milk production was evaluated in high producing lactating Holstein cows. Data of 6 herds with average 112 milking cows were used. Body condition scores were recorded 50 days before and 45 days after the calving. All cows in each herd were dried off 50-70 days before expected calving and moved to a far-off dry herd with dry matter intake of 3 kg alfalfa, 5 kg corn silage, 1.5 kg wheat straw and 3 kg far-off concentrate (CP: 162 g/kg; ME:12.4 MJ/kg). The cows were moved to the close-up dry herd around 25 days before calving. Close-up dry ration (DM basis) was consisted of 2.2 kg alfalfa, 6.1 kg corn silage, 1.9 kg wheat straw, 5.2 kg concentrate (CP: 176 g/kg; ME: 13.2 MJ/kg), and 300 g of anionic salts. In 3 herds, the close-up ration was supplemented with 0.25 kg palm fat prills (99.5% fat). After parturition, all cows were fed a total mixed ration (as DM) based on 24% alfalfa, 14% corn silage and 60% concentrate. This ration met the requirements of high producing cows (CP: 180 g/kg; ME: 12.2 MJ ME/kg DM). Cows were inseminated around 60-85 days in milk after a presynch-ovsynch estrous synchronization program. During the first

90 days of lactation, weekly milk production was recorded. Data were analyzed using GLM procedure of SAS. Retained placenta, metrits and endometrits were lower in cows fed fat supplemented close-up ration compared with the non-supplemented cows. First 90 days milk yield was significantly influenced by close-up fat supplementation ($P < 0.05$). Milk yield of fat supplemented and non-supplemented cows was 41.3.8 and 39.6 kg/d/head, respectively. Milk yield appeared to be depressed in postpartum thin cows (BCS= 2.4) compared with normal cows (BCS= 2.9). Results of the present study indicated that fat cows (BCS more than 4.6 before dry off) resulting in lower milk production. It was concluded that relationship between close-up period fat supplementation and milk production in the first 90 days was a critical point.

Key Words: Close-Up, Fat, Milk

T205 Soybean oil and linseed oil supplementation affect profiles of ruminal microorganisms and fermentation parameters in dairy cows. D. P. Bu[1], S. L. Yang[1], J. Q. Wang*[1], Z. Y. Hu[1], D. Li[1], H. Y. Wei[1], L. Y. Zhou[1], and J. Loor[2], [1]*State Key Laboratory of Animal Nutrition, Institute of Animal Science, Chinese Academy of Agricultural Sciences*, *Beijing, P. R. China*, [2]*University of Illinois*, *Urbana*.

The objectives of this study were to evaluate changes in ruminal microorganisms and fermentation parameters due to dietary supplementation of soybean and linseed oil alone or in combination. Four primiparous Holstein cows with permanent ruminal cannulas were randomly assigned to control (CK, 60:40 forage to concentrate) or CK with 4% soybean oil (LOC1), 4% linseed oil (LOC2), or 2% soybean oil plus 2% linseed oil (LOC3) in a 4 × 4 Latin square with 12-week periods. Forage and concentrate mixtures were fed at 0800 and 2000 h daily. Ruminal fluid was collected every 2 h over a 12 h period on d 19 of each experimental period. Ruminal pH and concentrations of acetate and propionate did not differ but butyrate (10.4 vs. 9.5 mmol/L) and total VFA (109 vs. 104 mmol/L) were lower ($p < 0.05$) with oil supplementation compared with CK. Concentration of ruminal NH3-N (13.6 vs. 17.4 mg/dL) was greater ($p < 0.05$) due to oil compared with CK. Compared with CK, cows fed oil had lower ($p < 0.05$) cellulolytic bacteria (3.25×10^8 vs. 4.66×10^8 CFU/mL) and protozoa (9.04×10^4 vs. 12.92×10^4 CFU/mlL) colony counts. Proteolytic bacteria (7.01×10^8 vs. 6.08×10^8 CFU/mL) counts, however, were greater ($p < 0.05$) in response to oil compared with CK. Among oil treatments, the amount of *B. fibrisolvens*, *F. succinogenes*, and *R. flavefaciens* in ruminal fluid (measured by real-time PCR) was substantially lower ($p < 0.05$) due to oil supplementation primarily when LOC2 was fed *R. albus* concentration decreased by an average of 40% regardless of oil level or type. Overall, results indicate that some ruminal microorganisms, except proteolytic bacteria, are more susceptible to dietary PUFA supplementation above 2% of DM, particularly when linolenic acid-rich oils are fed. Dietary oil effects on ruminal fermentation parameters seemed associated with the profile of ruminal microorganisms.

Key Words: Soybean Oil, Linseed Oil, Rumen Fermentation

T206 Effects of soybean oil and linseed oil supplementation on digestibility of nutrient and milk composition in dairy cows. D. P. Bu, Z. Y. Hu, J. Q. Wang*, S. L. Yang, D. Li, H. Y. Wei, and L. Y. Zhou, *State Key Laboratory of Animal Nutrition, Institute of Animal Science, Chinese Academy of Agricultural Sciences*, *Beijing, P. R. China*.

The objectives were to examine the effects of dietary supplementation of soybean and linseed oil alone or in combination on intake, apparent ruminal digestibility, and total tract digestibility of DM, OM, NDF, ADF, milk production and composition in dairy cows. Four primiparous Holstein cows with permanent ruminal cannulas were randomly assigned to control (CK, 60:40 forage to concentrate) or CK with 4% soybean oil (LOC1), 4% linseed oil (LOC2), or 2% soybean oil plus 2% linseed oil (LOC3) in a 4 × 4 Latin square with 12-week periods. Forage and concentrate mixtures were fed at 0800 and 2000 h daily. The results indicated that intake, apparent ruminal digestibility, and total tract digestibility of DM, OM, NDF, ADF were not affected by the oil supplementation ($P>0.05$) ,however the fat supplement tended to reduce the digestibility of DM, OM, NDF, ADF on rumen and total tract ($P>0.05$). Cows fed diets with fat supplementation did not alter milk production, milk Lactose and milk protein percentage or production ($P > 0.05$). Milk fat percentage, however, numerically decreased for cows fed diets supplemented with fat compared with that for cows fed the control diet (3.45% vs. 3.21%; $P < 0.01$). Cows fed supplemented fat had lower concentration of C16:0 and C16:1 ($P < 0.01$), but higher concentration of C18:0, trans-18:1, cis-18:1, C18:2, and C18:3 ($P < 0.01$) than did cows fed the control diet. The proportions of cis9, trans11 CLA were increased by 236%, 156% and 176% in LOC1, LOC2 and LOC3 treatments compared with cows fed control diet, respectively. Results showed fat supplementation (4% of diet DM) in dairy cows appeared to have a negative influence on rumen and total tract digestibility, but did not affect milk production, milk Lactose and milk protein percentage or production

Key Words: Soybean Oil, Linseed Oil, Digestibility

T207 Effect of dietary linoleic acid and forage level on conjugated linoleic acid content in plasma and milk. D. P. Bu, J. Q. Wang*, S. J. Liu, H. Y. Wei, and L. Y. Zhou, *State Key Laboratory of Animal Nutrition, Institute of Animal Science, Chinese Academy of Agricultural Sciences*, *Beijing, P. R. China*.

The objective of the study was to examine the effect of dietary linoleic acid (LA) and forage level on conjugated linoleic acid (CLA) content in plasma and milk. Twenty-four Chinese Holstein dairy cows, 117.6 ± 52 d in milk and 23.6 ± 4.63 kg/d milk were allocated to four treatments arranged in a 2 × 2 factorial design. Four treatments were a high forage (60% of dry matter basis) diet without LA (HFC), a high forage (60%) diet with LA (HFLA), a low forage (40%) diet without LA (LFC), or a low forage (40%) diet with LA (LFLA). LA was added through sunflower oil (contained 59% LA) by replacing the corn in the diet. Diets were isonitrogenous (average of 16.5%) and were fed as a total mixed ration 3 times a day. Milk yields were recorded twice a week and milk samples were collected weekly. Measurements were made during the last 6 wk of the 9 wk experimental period. Blood samples were taken from coccygeal vein or artery at 4h postfeeding at the end of the 9 wk experimental period. Data were analyzed with animal, period, LA level, forage level and two-way interaction between LA and forage level in the model. LA intake was increased when cows were fed either LA (140.2 vs. 446.6 g/d, $p<0.001$) or low forage diet (284.0 vs. 302.8 g/d, $P<0.001$). Milk fat content was 3.81^a, 3.11^{ab}, 3.60^a and 2.66^b in HFC, HFLA, LFC and LFLA respectively. Percentages of 8:0 to14:0 and 16:0 in milk fat were decreased with LA addition ($p<0.05$) Dietary forage