Prediction of response to selection on principal components for growth traits in Nellore cattle

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The selection of breeding animals based on combined traits has been primarily done according to the Selection Index (SI) theory. However, SI derived from Principal Components (PCs) was suggested as an alternative for combining different selection criteria. This study was carried out to compare the genetic progress expected by selecting animals based on PCs or SI used by Nellore cattle breeding programs in Brazil (Final Index, FI). The PCs were obtained from growth traits, i.e. weaning and yearling weight gain and visual scores (conformation, precocity and muscling), and scrotal circumference (reproductive-performance indicator trait). The dataset included phenotypic and pedigree information from 355,524 animals. Variance components and EBVs were obtained from a multivariate analysis using a mixed linear animal model. PCs were obtained from the eigen-decomposition of the additive genetic (co)variance matrix among traits. Standardized genetic gains per generation were predicted for each trait. The PC1 showed higher overall genetic progress (expected genetic gain in each trait ranged from: 0.68 to 1.21) when compared to PC2 and PC3. However, lower than that obtained for FI (range: 0.98 to 1.45). The PC2 showed negative gains for growth traits and conformation (range: -0.85 to -0.03) and positive gains for the other traits (range: 0.14 to 0.52). For PC3, genetic gains ranged from -0.28 to -0.10 for weaning traits and from 0.03 to 0.81 for yearling traits. The first PC and the FI yielded to favourable genetic gains for all traits, while the PC2 and PC3 would lead to a change in animal biological type (early or late growth biotypes and weaning or yearling performance, respectively) when used as criteria for selection in Nellore cattle.

Effects of gluconeogenic supplements on energy metabolism and fertility in suckler cows

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It was hypothesized that the intake of gluconeogenic supplements around fecundation has a flushing effect on energy metabolism and fertility in suckler cows. The effect of three gluconeogenic supplements on insulin, metabolites, productive and reproductive parameters was studied in 39 lactating Parda de Montaña cows (6.8±2.6 years; 568±65 kg live-weight (LW); 2.8±0.2 body condition score (BCS)) during a 24-day trial. Cows were fed daily 9 kg alfalfa hay and 1 kg triticale meal. At 50±15 days postpartum, cow-calf pairs were distributed into 4 treatments: (1) PRO, 228 g supplement/cow/day (containing 65% propilenglycol); (2) GLY-PRO, 366 g/cow/day (33% glycerine + 9.5% propilenglycol); (3) GLY, 375 g/cow/day (40% glycerine); (4) CONTROL. Supplements were offered from day 1 to 8 (period 1) and from day 16 to 24 (period 2) of the study. Before and after each period, two blood samples (in 48 h) were collected to determine the concentration of insulin, glucose, β-hydroxibutyrate, urea and non-esterified fatty acids (NEFA), and LW and BCS were registered. Concurrently with period 2, cows were involved in a Cosynch protocol and were inseminated on day 24 (pregnancy was diagnosed by ultrasound 35 days later). During the trial, GLY-PRO cows lost less LW than PRO and GLY groups (-8 vs -19 and -16±2.8 kg; $P<0.05$), and similar to CONTROL (-13 kg). Calves from GLY group had lower LW gain than GLY-PRO and CONTROL calves (0.536 vs 0.866 and 0.804±0.083 kg/day; $P<0.05$), and similar to PRO calves (0.704 kg/day). Insulin and metabolite concentrations were affected by the interaction between treatment and time ($P<0.05$), except for glucose ($P>0.05$). GLY-PRO cows showed the highest values of insulin and NEFA after the first period of gluconeogenic supplementation ($P<0.05$). Fertility rate was 50% in PRO, GLY-PRO and CONTROL groups, and 60% in GLY ($P>0.05$). In conclusion, the intake of gluconeogenic supplements during two short periods prior to insemination had slight effects on cow-calf weight gains and energy metabolism, but did not improve fertility in suckler cows. Further studies with longer supplementation times should be evaluated.

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Effects of gluconeogenic supplements on energy metabolism and fertility in suckler cows

Lobón[1], S., Ferrer[1], J., Gómez[2], M.A., Noya[1], A., Casasús[1], I., Mantecón[2], C., Sanz[1*], A.

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It was hypothesized that the intake of gluconeogenic supplements around fecundation has a flushing effect on energy metabolism and fertility in suckler cows

OBJECTIVE

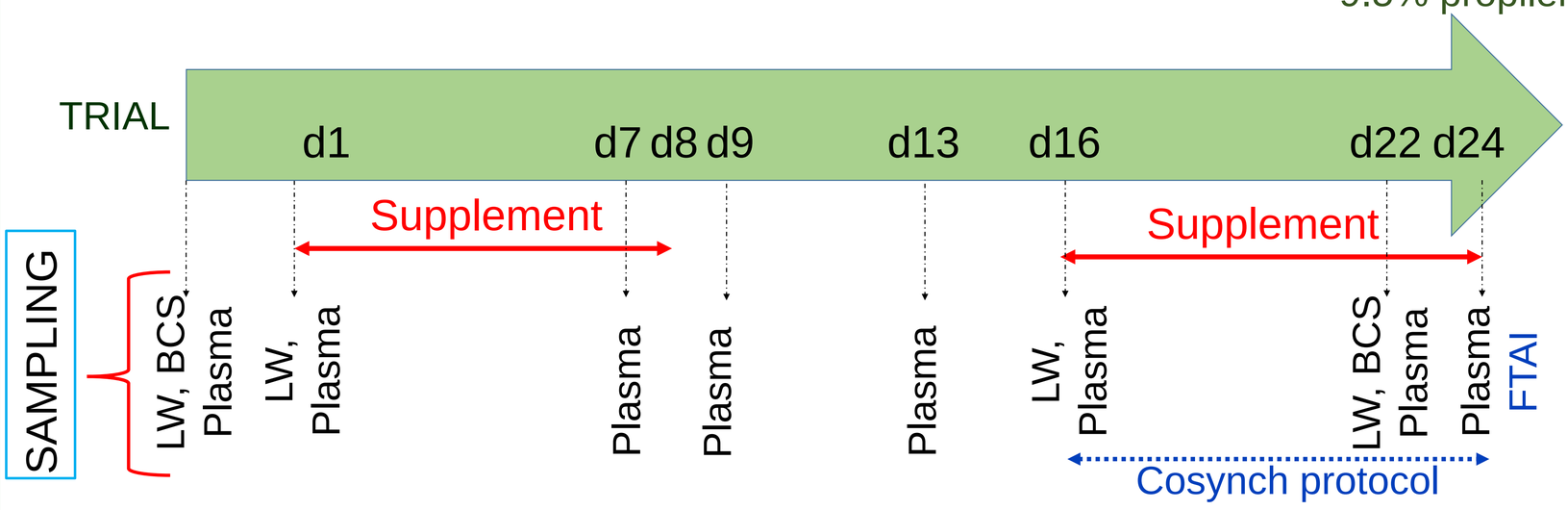
To study the effect of three gluconeogenic supplements in lactating cows on insulin, metabolites, and productive and reproductive parameters

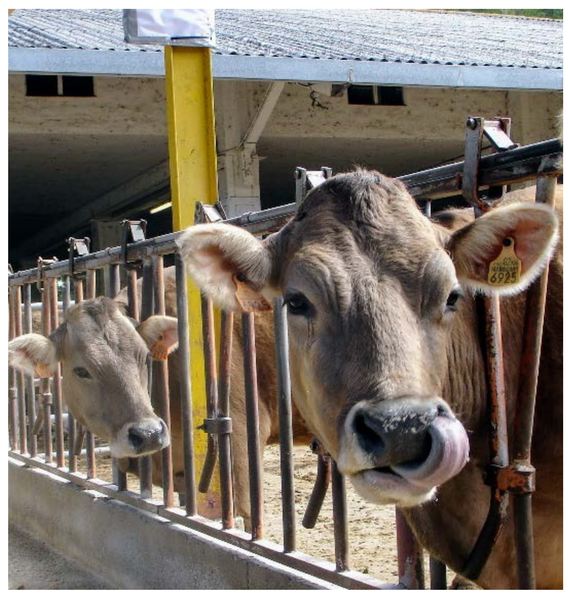
Materials and Methods

- 38 lactating Parda de Montaña cows
- At calving: 600 kg LW, 2.8 BCS (1-5 scale)
- 9 kg alfalfa + 1 kg triticale meal/cow/d
- Two periods of supplementation (8 and 9 d)

Gluconeogenic supplements, g/cow/d

- **PRO** n=10: 228 g, 65% propilenglycol
- **GLY-PRO** n=10: 366 g, 33% glycerin, 9.5% propilenglycol
- **GLY** n=10: 375 g, 40% glycerin
- **CONTROL** n=8





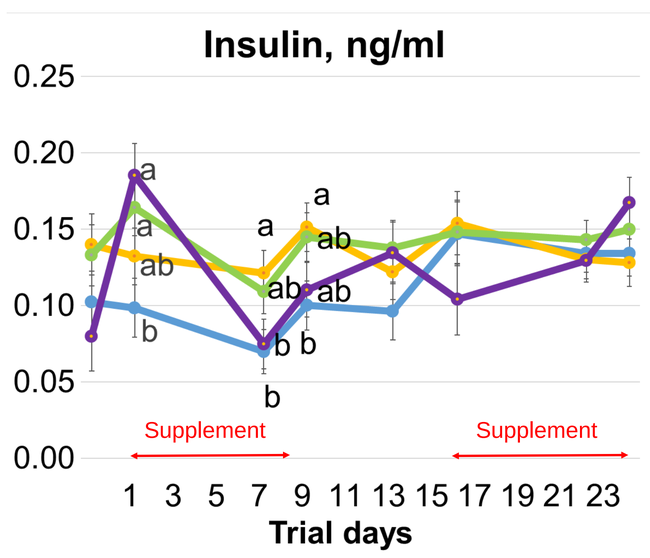
PLASMA: insulin, glucose, non esterified fatty acids (NEFA), β-hydroxibutyrate, urea

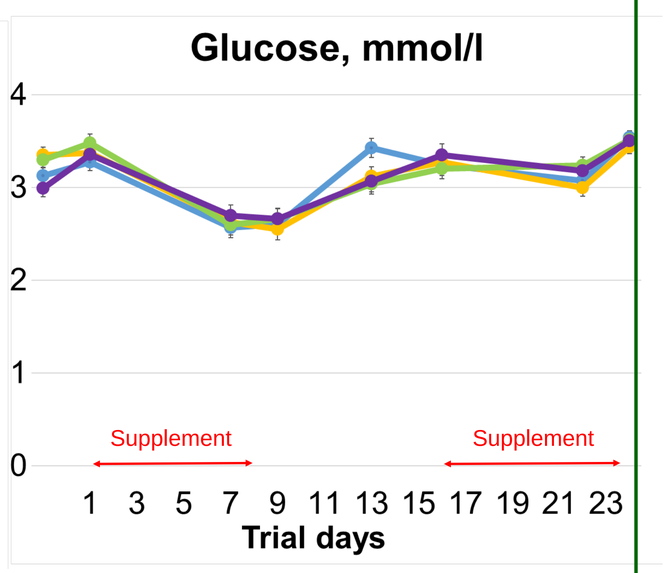
CALF LW: d10, 24 and 59. FTAI: Fixed-time artificial insemination. Pregnancy diagnosis (d59): 35 d post FTAI

Results

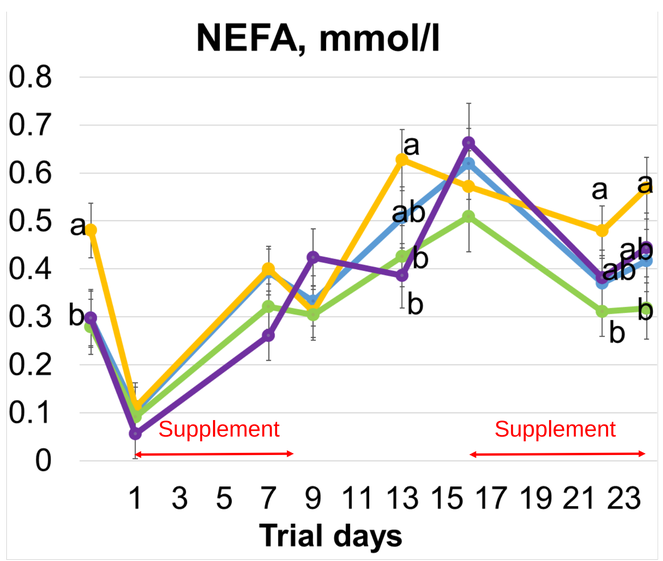
Cows	PRO	GLY-PRO	GLY	CONTROL	Sig.
LW d1, kg	557	558	561	561	NS
LW variation d1-24, kg	-19b	-8a	-16b	-13ab	*
LW variation d24-59, kg	-16	-22	-16	-20	NS
BCS d1 (1-5 scale)	2.78	2.83	2.81	3.00	NS
BCS variation d1-24	-0.21	-0.15	-0.03	-0.15	NS
BCS variation d24-59	0.04	-0.04	-0.05	-0.19	NS
Fertility rate, %	50	50	60	50	NS
Calves					
LW birth, kg	47.0	46.7	40.9	42.7	NS
ADG d10-24, kg	0.70ab	0.87a	0.54b	0.80a	*
ADG d24-59, kg	0.70	0.61	0.65	0.63	NS

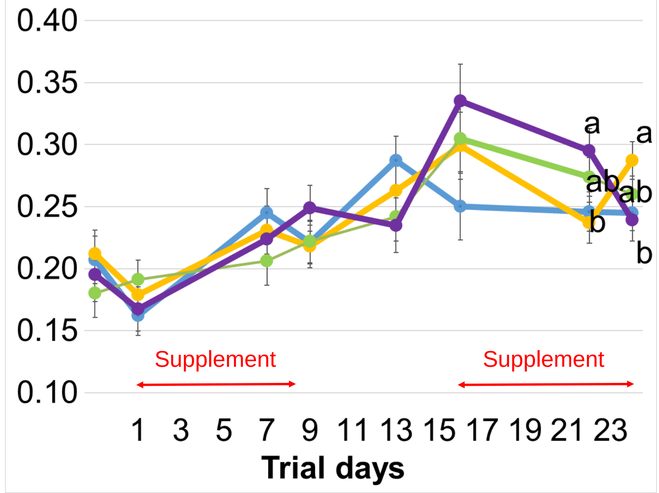
*=P<0.05, NS= P>0.05

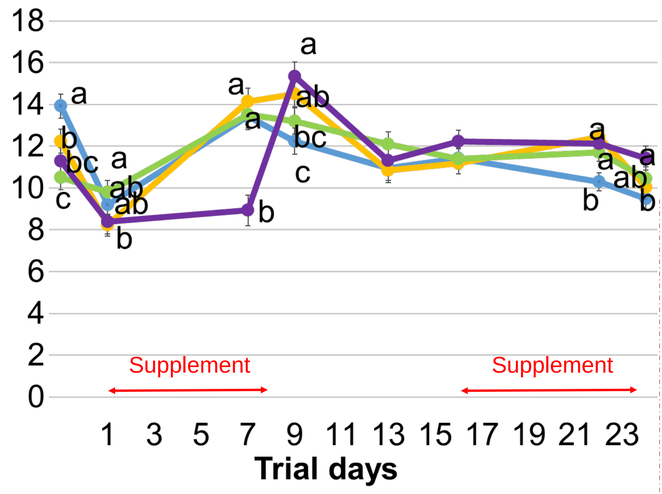




PRO GLY-PRO GLY CONTROL







Conclusions

The intake of gluconeogenic supplements during two short periods prior to insemination had slight effects on cow-calf weight gains and energy metabolism, but did not improve fertility rate in suckler cows. Further studies with longer supplementation times should be conducted.

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