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Table S1. Studies involving high-energy diets fed to dairy male calves and steers for beef production

Category/Breed	Phase/Age	Source/Feed/Treatment	F/C ratio	DMI (kg/d)	ADG (kg/d)	CY (%)	FC	G:F	Observed effects	Reference
Holstein calves	Post-weaning (9.5 - 17.6 weeks of age)	WSC diet	0/100	2.80 ± 0.32	0.901 ± 0213	-	-	-	Loss of whole corn grains in feces was 1.03% of the grain ingested and did not correlate with concentrate digestibility. No bloating or locomotion disturbances occurred, suggesting that ruminal acidosis was not a problem in these animals.	(22)
Holstein steers	Post-weaning and finishing (196 days old, confined 210 days, leaving at approximately 13.5 months old).	Diets [1) 100% concentrate; 2) 55% concentrate + Corn silage; and 3) 55% Concentrate + Oat hay]	1) 0/100 3) 45/55 c) 45/55	1) 6.84c 2) 7.61b 3) 8.17a	1) 1.350a 2) 1.278ab 3) 1.226b	-	1) 5.28c 2) 6.03b 3) 6.83a	-	The use of a 100% concentrate diet presents quite clear advantages in terms of performance and is therefore considered an interesting alternative for finishing dairy steers in confinement.	(15)
Holstein steers	Post-weaning and finishing (entry weight 181 kg, 2.5 months of age, and 216 days in feedlot)	Diets [1) 100% (90% corn + pelleted core) concentrate; 2) 90% corn + core + VMY; 3) 90% corn + core + $NaHCO_3$]	0/100	6.11	1) 1.29a 2) 1.09b 3) 1.10b	48.19	1) 4.87b 2) 5.59ab 3) 5.83a	1) 0.21a 2) 0.18b 3) 0.17b	The diet composed of the commercial supplement (core), from the perspective of meat quality, is recommended as it does not differ from other diets and provides better animal performance without altering the chemical-physical characteristics of centesimal muscle compounds.	(28)
Holstein steers	Post-weaning and finishing (3, 6, and 9 months, finished at 10 months)	1) WSC + pelleted core; 2) Babassu diet; 3) Corn diet with the inclusion of 100.0 g/kg of FMB; 4) Corn diet with the inclusion of 316.8 g/kg WSM or sorghum.	0/100	1) 3.91a 2) 2.65b 3) 4.56a 4) 4.54a	1) 1.00a 2) 0.73b 3) 1.02a 4) 1.05a	1) 54.88a 2) 54.75a 3) 51.93b 4) 54.73a	-	-	The authors recommend that millet or sorghum in whole grain form can be included at 316.8 g/kg DM in the diet of ruminants, which does not modify the metabolism and, consequently, the performance of calves up to 10 months of age.	(29)

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Holstein steers	Post-weaning and finishing (60-305 days)	WSC + Pellet	0/100 [100=90/10]	-	1.314	48.9	-	-	Individual profit was USD 41.64 (BRL 200.75). Finishing males of dairy origin can become an alternative to culling, generating a second income within dairy farms, and filling a new market niche.	(18)
Holstein steers	Growth (initial stage in feedlot), 127.7 ± 2.1 kg BW, fed for 63 days.	SFC-based diet supplemented with a) 0% and b) 3.5% yellow fat*[1] (DM basis).	16/84	4.74	a) 1.25 b) 1.31	-	-	a) 0.262 b) 0.278	Inclusion of 3.5% supplemental YF in a SFC-based feedlot diet for Holstein calves does not impair DMI but tends to increase ADG, GE, and estimated dietary NE.	(31)
Holstein steers	Post-weaning and finishing (7-13 and 13-30 weeks, respectively)	Previously fed low (a) and high (b) doses of MR. Then, a compound feed (pellet), straw, and water were provided *ad libitum*	20/80	a) 3.87 vs. 3.77 b) 6.78 vs. 6.75	a) 1.29 vs.1.33 b) 1.47 vs. 1.45	a) 51.6 vs. b) 51.2	-	-	Holstein calves fed a high amount of MR before weaning showed improved growth around weaning, resulting in heavier animals at the beginning the post-weaning phase.	(13)
Holstein steers	Post-weaning and finishing [a) 112 days, b) 112-302 days in feedlot, respectively].	A SFC-based diet supplemented with (DM basis): 1) control, no feed additive; 2) 6.6 mg/kg of flavomycin; 3) 13.2 mg/kg of flavomycin; and 4) 30 mg/kg of MON	18.5/81.5	a) 7.54 b) 10.17 P>0.05 (both)	a) 1.50 vs. b) 1.57 P>0.05 (both)	61.72	-	-	Supplementation of Holstein steers calves fed SFC-based diets with flavomycin at 6.6 or 13.2 mg/kg or 30 mg/kg MON had similar effects on calf performance in the post-weaning and finishing phases.	(41)

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Holstein steers	Post-weaning and finishing [(113 ± 1 days), 3 feedlot periods (0-112, 112-224, and 224-305 days)]	Animals were fed SFC-based diets and divided into ICW categories [a) 105, b) 112, c) 117, d) 123, and e) 129 kg]	-	a) 7.29 b) 7.35 c) 7.43 d) 7.39 e) 7.93	a) 1.31 b) 1.39 c) 1.41 d) 1.37 e) 1.43	a) 61.7 b) 62.4 c) 62.5* d) 62.2 e) 61.5 (QE, P<.05)	-	a) 0.18 b) 0.189* c) 0.189* d) 0.186 e) 0.180 (QE, P<0.05)	ADG increased linearly with birth weight (at arrival). DMI increased linearly during the first 224 days. Initial arrival weight influences the growth performance and energy efficiency of Holstein steers of similar age. The effect is more pronounced in lighter steers (<112 kg).	(20)
Holstein steers	Finishing [a) start 0-112 days, IBW 131.45 kg; b) end 112-224 days)]	A SFC-based diet supplemented with VMY (0 and 22.5 mg/kg) and two doses of MP (87 vs. 100% of NRC (2000) requirements)	18.5/81.6	a) 5.84 b) 8.34	a) 1.29, 1.37*, 1.32, 1.37* b) 1.59*, 1.54, 1.59* 1.56	62.15	-	-	The study concludes that regardless of supplemental MP levels, supplemental VMY improves the overall growth performance and energy utilization efficiency of Holstein steers.	(33)
Holstein steers	Finishing (feedlotting at 112 days, IBW 122 kg)	SFC-diet supplemented with DDGS but supplemental MP and protected methionine supplement at the rates of 0% and (b) 0.066; 0.096 and 0.128% of DM	18.5/81.5	a) 5.18 b) 5.32*	a) 1.14 b) 1.25*	-	-	-	MP supplementation increased (10%) overall 112-day ADG; however, additional effects of methionine supplementation on ADG were not noted.	(7)
Holstein steers	Post-weaning (IBW 136 kg), confined for 111 days.	Increasing levels of replacement of SFC with DDGS [a) 10%, b) 15%, c) 20%, and d) 25% DM).	18.5/81.5	a) 5.97 b) 5.76 c) 5.82 d) 5.85	a) 1.43 b) 1.42 c) 1.41 d) 1.45	-	-	a) 0.240 b) 0.248 c) 0.243 d) 0.248	Replacing SFC with DDGS increases DMI and AA leaving the abomasum. However, this effect was insufficient to enhance the growth performance of calves during the first 111 days of feeding.	(38)
Holstein steers	Finishing (IBW 451 ± 6 kg, 12-15 months of age, 112 days in feedlot)	A (a) WSC- or (b) DRC-based diet	10/90	12.07	1.71	a) 59.06 and b) 59. 27	7.06	0.142	There was no difference in ADG, DMI, or feed efficiency. However, steers fed DRC had 28% less fecal starch and 8% higher estimated total tract starch digestibility when compared to those fed WSC (25.41 vs. 18.3% and 83.12 vs. 89.08%, respectively).	(36)

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Holstein crossbred steers	Finishing phase (up to 15 months of age)	High or low supplementation level during the initial phase on pasture, before confinement	20/80 vs. 50/50	8.81 vs. 8.21	1.45 vs. 1.30	-	6.19 vs. 6.37	-	The high level of energy supplementation during the post-weaning phase allowed the animals to gain greater weight when entering confinement and, consequently, improve subsequent performance	(1)
a) Holstein and b) Crossbred (Holstein × Angus).	238 days in feedlot	1) No additive; 2) 30 mg of MON, DM basis) (Rumensin 90, Elanco, Greenfield, IN); 3) 1.5 g TAN/ kg of DM (TAN; ByPro, 70% condensed tannin, SilvaFeed, Indunor, S.A., Buenos Aires, Argentina); 4) MON + TAN	18.5/81.5	Treatment average = 7.92 a) 8.06 vs. b) 7.79	1.48	Treat. average = 61.82 a) 61.4 vs. b) 62.3		Treatment average = 0.187 a) 0.182 vs. b) 0.192	Feed additives did not appreciably affect steer growth performance or carcass traits, but A × H crossbred steers had greater growth performance, efficiency of dietary energy utilization, and carcass quality metrics.	(34)
Holstein vs. Angus steers	Finishing (Holstein = 548 ± 6.3 kg, 22 ± 1 months of age; Angus = 596 ± 7.6 kg, 22 ± 1 months of age)	Two breeds: Holstein and Angus. Different corn kernel processing methods (1 WSC and 2) FGC	10/90	a) 13.34 vs. b) 12.08 1) 12.11 2) 12.84 3) 12.32	-	-	-	-	Holstein steers had higher DMI, but no differences between diets was were found. However, differences were observed in DMI between whole and processed grain diets (71.52 vs. 74.35%).	(37)

DDGS = distillers dried grains; *WSC* = whole shelled corn; *SFC* = steam flaked corn; *WSM* = whole shelled millet; *MP* = metabolized protein; MON = monensin; *VMY* = virginiamycin; *TAN* = tannins; *DMI* = dry matter intake kg/d; *ADG* = average daily gain, kg/d; *FC* = feed conversion, kgDMI/kgADG; *GE* = gain efficiency, kgADG/kgDMI. (*) significance level. * **1** Chemical composition of yellow grease: 93% total fatty acids; FAC color 39; 15% free fatty acids; 2% moisture, 2% unsaponifiables, and 1% insoluble material. * **dNTG** is a blend of silicon dioxide, calcium aluminosilicate, sodium aluminosilicate, dehydrated brewer's yeast, mineral oil, calcium carbonate, rice hulls, niacin, biotin, d-calcium pantothenate, choline chloride, thiamine mononitrate, pyridoxine hydrochloride, riboflavin-5-phosphate, and folic acid.