

Assessment of dairy cow performance fed soybean meal or canola meal through a meta-analysis

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Performance of dairy cows fed soybean (SBM) meal in comparison with canola meal (CM) remains controversial. The objective of this study was to evaluate dry matter intake (DMI), milk yield, and milk composition of cows fed diets containing either SBM or CM. Data from 10 published papers (1998-2019) were evaluated through a meta-analysis performed using fixed or random effect models in R. The degree of heterogeneity was measured with I^2 statistics. Publication bias was determined with funnel plots and Egger's regression test. Other sources of heterogeneity of response were analyzed through a mixed-effect meta-regression. Estimated effect size was calculated for DMI, milk yield, and milk composition. The meta-analysis indicated no evidence of publication bias for any of the variables tested. Cows fed diets with SBM produced 0.41 kg/d less milk than cows on diets with CM. However, DMI, energy corrected-milk (ECM), milk composition, and feed efficiency (FE) were not affected by meal protein source. Meta-regression indicated that the inclusion of forage and grain in the diets affected milk yield. Overall, there was no difference in performance and efficiency between cows fed CM- or SBM-based diets.

Table 1. Estimated effect size derived from meta-analysis in dairy cows fed diets containing SBM or CM.

Outcome	Cows (n)		Weighted mean difference for SBM – CM [95% CI]	Effect size [95% CI]	I^2 (%)	<i>P</i> -value for effect size	<i>Begg's</i> <i>test</i>
	SBM	CM					
DMI (kg/d)	81	81	-0.32 [-0.77, 0.13]	-0.18 [-0.49, 0.13]	0.0	0.16	0.75
Milk yield (kg/d)	81	81	-0.41 [-0.73, -0.09]	-0.41 [-0.73, -0.09]	0.0	0.01	0.24
ECM (kg/d)	81	81	0.25 [-0.72, 0.22]	-0.20 [-0.51, 0.11]	0.0	0.21	0.52
Fat (%)	81	81	0.14 [-0.32, 0.60]	0.09 [-0.23, 0.40]	0.0	0.59	0.36
Fat yield (kg/d)	81	81	0.009 [-0.44, 0.46]	0.0002 [-0.31, 0.31]	0.0	0.97	0.80
Protein (%)	81	81	-0.003 [-0.43, 0.42]	0.002 [-0.31, 0.31]	0.0	0.99	0.98
Protein yield (kg/d)	81	81	-0.02 [-0.45, 0.41]	-0.01 [-0.32, 0.30]	0.0	0.93	0.19
Lactose (%)	81	81	0.04 [-0.37, 0.45]	0.02 [-0.29, 0.33]	0.0	0.85	0.26
Lactose yield (kg/d)	81	81	-0.01 [-0.40, 0.38]	-0.01 [-0.32, 0.30]	0.0	0.95	0.57
FE (ECM/DMI)	81	81	0.02 [-0.07, 0.10]	0.03 [-0.28, 0.34]	0.0	0.73	0.86

Key words: meta-analysis, canola or soybean meal, milk yield