

Comparison of milk yield and milk composition between organic and conventional systems: a meta-analysis

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Consumers often point out health reasons for purchasing organic food products despite inconclusive information regarding health benefits; for example, conjugated linoleic acid (CLA) is associated with anticarcinogenic, antiatherogenic, antiobesity, immune system enhancement and antidiabetic effects (Schwendel et al., 2015). The aim of this study was to compare Conventional (CS) vs Organic (OS) milk production systems using a meta-analysis approach. Three independent analytic reviews were carried out by three field experts to avoid the review-bias. The final database comprised 39 published studies that fulfilled the inclusion criteria. The outcome variables considered for this study were milk yield (MY), fat, protein, lactose, CLA, polyunsaturated fatty acids (PUFA), monounsaturated fatty acids (MUFA), alpha-linolenic acid (ALA) and vaccenic acid content; with specie (cow, sheep, goat and buffalo), breed, system type (intensive or extensive), daily feed intake (DFI), diet composition (forage to concentrate ratio, NDF and ADF content) and experimental unit (animal, herd and bulk tank) as explanatory variables. The ‘meta’ package (Schwarzer, 2016) in R software was used to perform the meta-analysis. The random model was expanded to a mixed model (MM) to detect sources of heterogeneity using the “Metafor” package (Viechtbauer, 2010). MY was higher for CS (P=0.001) showing considerable heterogeneity ($I^2 = 98.6\%$), which was reduced to 58.4% when NDF, breed, specie and system type were included into the model. Contrary to this, milk PUFA (P=0.001) and CLA content (P=0.02) from OS were higher. There was a considerable specie variation for both variables with cow milk showing higher PUFA, while ewe milk had higher CLA content (>1.34). Desirable FA components (PUFA, MUFA, ALA and CLA) were affected by specie, breed and NDF content.

Item	Number of studies (n)	Effect size	P value	I ² RM	I ² MM	Significant effects meta-regression
Milk yield	39	-0.63	0.0002	95.4	58.24	NDF, Breed, Specie, System
Fat content	30	0.016	0.18	91.3	88.9	Breed
Protein content	25	-0.182	0.28	90.8	41.36	System, Experimental unit, Breed
Lactose content	17	-0.03	0.60	79	76.6	Breed, Experimental unit, Specie
PUFA	22	1.32	0.001	98.8	19.66	Breed, Specie, NDF
MUFA	22	0.42	0.27	98.4	86.05	Breed, Specie, NDF
ALA	20	2.05	0.0001	98.7	52.78	Breed, Specie, System, NDF
Vaccenic	22	1.37	0.35	96.0	83.1	NDF, Specie, Breed, System
CLA	19	0.76	0.02	96.3	94.6	Specie, NDF, Feed intake

RM, random model; MM, mixed model

Table 1. Effect of fat supplementation on milk and chemical composition in dairy sheep milk.

The results of this systematic review suggest that milk produced under organic systems has a higher content of beneficial components to human health, mainly associated with their fatty acid profile.

References

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