The influence of farm and herd factors on the health status of organic dairy cattle under low concentrate feeding considering an assessment-tool for site-related breeding

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Introduction

- Utilizing grass for ruminant production is vital in the context of food security.
- Re-linking ruminant production to grassland resources can improve animal health and is a basic component of organic farming.
- Several dairy genotypes may not be well suited to organic systems.
- Site-relatedness criteria are needed to define breeding goals and management tools for farm and cow types in organic farming.

Methods

Data collection:
- 67 Swiss and 5 German organic dairy farms (0% to 10% concentrates of total yearly DMI).

Farm and herd factors:
- Farm and herd assessment by means of an estimation tool (see Spengler et al., 2007).
- Body condition score (BCS).
- Farm statistics and milk recording data.

Site-relatedness:
- Difference between farm and herd score calculated by the estimation tool.

Health and reproduction indicators:
- Herd means of calving interval (CI), risk of acidosis (fat-to-protein ratio [FPR] < 1.1) and risk of ketosis (FPR > 1.5), somatic cell score (SCS), veterinary treatments (udder treatments and all treatments), and herd average of number of lactations.

Data analysis:
- After factor pre-selection multivariate linear regression with stepwise backwards elimination.

Discussion

- Dairy cattle characterized by stable BCS values might be better suited for grazing systems with low to zero concentrate feeding.
- Breed impact only on udder treatments; suitability of individuals for zero concentrate supplementation varies within breeds.
- Major influence of feeding and feeding management.
- Site-relatedness strongly associated with fertility.
- Estimation tool is a useful tool for improving the compatibility between cow and system.

Results

Table 1: Regressions of influences on the risks of acidosis and ketosis

Indicator	Risk of acidosis*		Risk of ketosis[†]	
Factor	Estimate	p	Estimate	p
Spring and autumn grazing quantity	3.438	0.075	–2.495	0.011
Minimum BCS of 4 values within 1 year	31.971	0.011		--
Lightness of housing	6.633	0.023		--
Summer grazing system (intensity)	2.803	0.094		--
Percentage of cows of all roughage feeders	--		0.130	0.008

* adj.R² = 0.155; F = 4.206; p = 0.004; [†] adj.R² = 0.141; F = 6.671; p = 0.002; empty cells (--): p > 0,1

Table 2: Regressions of influences on udder treatments (categorized) and all treatments (logarithmized)

Indicator	Udder treatments*		All treatments[†]	
Factor	Estimate	p	Estimate	p
Summer grazing system (intensity)	–0.805	0.007	–0.032	0.034
Concentrate per kg energy-corrected milk	0.017	0.005		--
Breed: Braunvieh (reference: Fleckvieh)	1.179	0.009		--
Feeding management	–0.596	0.037		--
Precipitation	0.411	0.043		--
Feed purchase		--	0.037	0.003
Farm labour per 25 livestock units		--	0.030	0.032
Additional energy based roughage		--	0.024	0.032
Protein based roughage in winter		--	–0.032	0.041
Dimensions of housing		--	–0.024	0.064

* adj.R² = 0.338; F = 7.938; p < 0.001; [†] adj.R² = 0.298; F = 5.800; p < 0.001; empty cells (--): p > 0,1

Table 3: Regressions of influences on the somatic cell score*

Factor	Estimate	p
Difference between minimum and maximum BCS	0.907	0.042
Lightness of housing	0.261	0.077
Farm labour's interest ín dairy cows	–0.287	0.086

* adj.R² = 0.087; F = 3.251; p = 0.027

Table 4: Regressions of influences on the calving interval*

Factor	Estimate	p
Difference between minimum and maximum BCS	73.580	0.002
Difference between farm and herd score	–0.919	0.009
Age at first calving	1.875	0.084

* adj.R² = 0.154; F = 5.315; p = 0.002

Table 5: Regressions of influences on number of lactations*

Factor	Estimate	p
Spring and autumn grazing system (intensity)	0.337	0.003
Concentrate per kg energy-corrected milk	–0.004	0.030
Minimum BCS of 4 values within 1 year	1.320	0.031
Height at withers	–0.172	0.088

* adj.R² = 0.237; F = 6.507; p < 0.001

Conclusion

Site-relatedness can be achieved by two measures: (1) The adjustment of the cow type or (2) the adjustment of the environment.

→ Since changing the environment in organic systems is limited farmers, breeders, farm advisors and veterinary surgeons may use site-relatedness parameters to improve and maintain health and reproduction in organic dairy cows.

Reference: Spengler Neff A, Klocke P, Ivemeyer S & Bapst B (2007): Einführung eines Hilfsmittels zur Einschätzung der Standortgerechtheit der Milchviehzucht und -haltung auf ökologischen Betrieben. Paper presented at: 9. Wissenschaftstagung zum ökologischen Landbau: Zwischen Tradition und Globalisierung, March 20-23, Stuttgart, Germany.

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