https://doi.org/10.17221/122/2025-CJAS

Impact of puerperal disorders on early culling and milk production in Slovak Spotted dairy cows

Karolína Pálešová[1], Jozef Bujko[1], Nina Moravčíková[1], Hana Vostrá-Vydrová[2], Adrián Halvoník[1], Luboš Vostrý[2], Radovan Kasarda[1]*

[1]*Institute of Nutrition and Genomics, Faculty of Agrobiology and Food Resources, Slovak University of Agriculture in Nitra, Nitra, Slovak Republic*
[2]*Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Prague, Czech Republic*

**Corresponding author: xpalesova@uniag.sk*

The authors are fully responsible for both the content and the formal aspects of the electronic supplementary material. No editorial adjustments were made.

Electronic Supplementary Material (ESM)

https://doi.org/10.17221/122/2025-CJAS

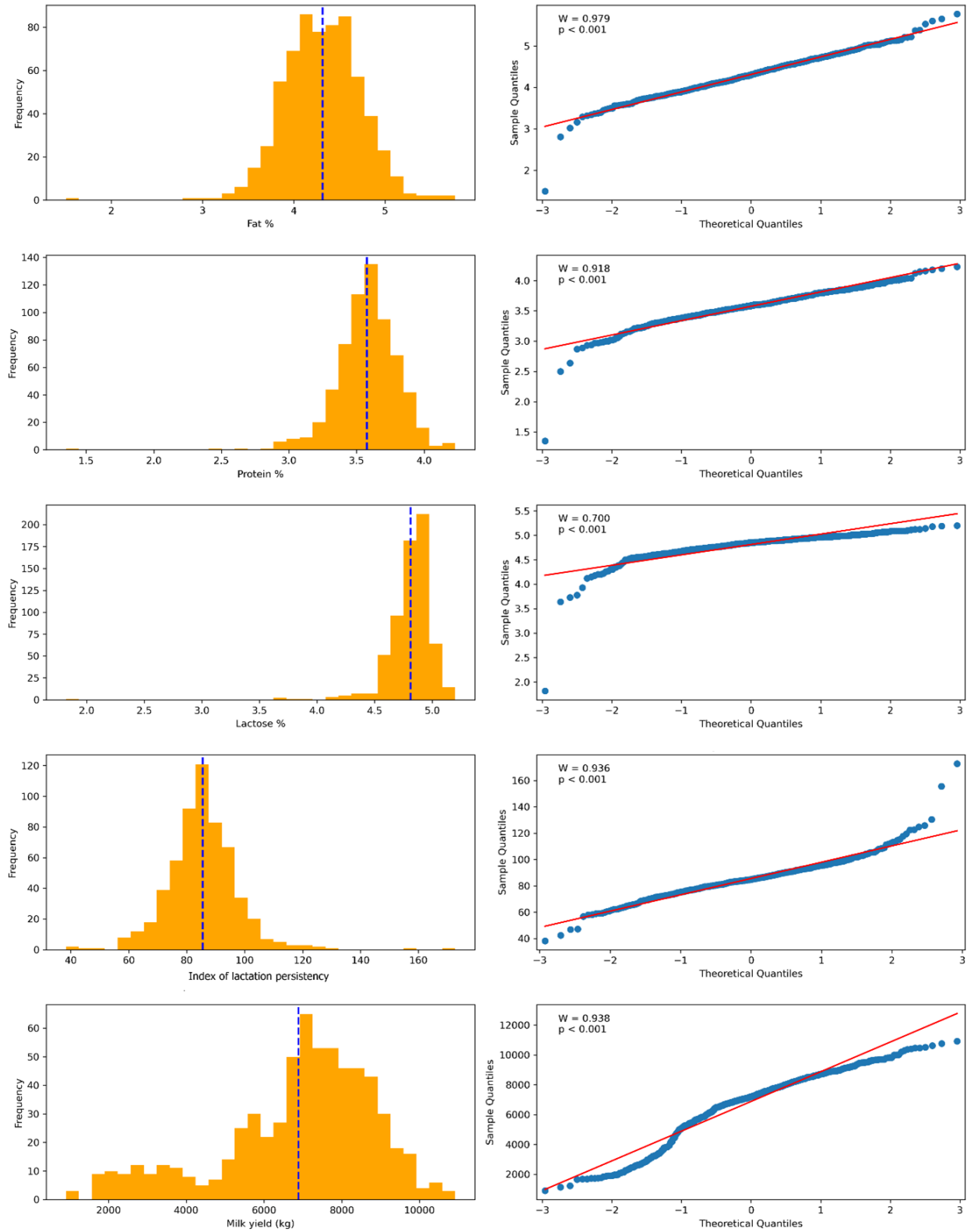

Figure S1. Test of normal distribution and deviations of variables of milk production traits

https://doi.org/10.17221/122/2025-CJAS

Table S1. Frequency of cows by sire line and lactation order

Variable	Category	*n*	%
Sire line	HW 047	101	17.4
	HRA 003	79	13.6
	HRA 001	71	12.2
	DLL 001	65	11.2
	RMN 023	37	6.37
	HRA 007	36	6.21
	WLD 001	32	5.52
	WLE 012	31	5.35
	Others	30	5.17
	HW 048	27	4.65
	HRA 012	24	4.16
	MAF 038	19	3.29
	HRA 004	18	3.10
	HRA 512	12	2.07
Lactation	1^{st}	248	32.7
	2^{nd}	161	21.2
	3^{rd}	172	22.7
	4^{th}	99	13.0
	Others (5^{th}–11^{th})	79	10.4

Table S2. Pairwise comparisons of milk yield between disease categories

Comparison	Difference	SD	SE	*P*-value
Healthy vs Ketosis	–449.45	1 653.92	244.52	0.100
Healthy vs Metritis	+1 280.53	1 657.03	398.44	0.027
Healthy vs RFM	–8.37	1 635.57	523.01	0.989
Healthy vs PP	+847.85	1 665.13	423.79	0.192
Healthy vs CD	–724.67	1 628.97	732.60	0.291
Ketosis vs Metritis	+1 729.98	1 946.35	533.62	0.007
Ketosis vs RFM	+441.08	1 840.11	636.41	0.499
Ketosis vs PP	+1 297.29	2 002.72	573.93	0.066
Ketosis vs CD	–275.22	1 809.03	847.85	0.687
Metritis vs RFM	–1 288.91	2 096.39	826.81	0.113
Metritis vs PP	–432.69	2 339.84	804.09	0.597
Metritis vs CD	–2 005.23	2 084.12	1 053.68	0.028
RFM vs PP	+856.21	2 246.81	905.76	0.321
RFM vs CD	–716.31	1 690.99	926.24	0.406
PP vs CD	–1 572.51	2 272.28	1 164.28	0.089

CD = comorbid diseases; PP = parturient paresis; RFM = retained foetal membranes; SD = standard deviation; SE = standard error

https://doi.org/10.17221/122/2025-CJAS

Table S3. Least squares means for milk yield with effects of disease status, lactation order and sire line

Model		Milk yield (kg)			
R^2		0.096			
P-value		<0.001			
Factor	Category	Estimate	SE	*t*-value	*P*-value
	intercept	7 493.55	988.96	7.58	<0.001
Disease occurrence	healthy	–362.57	770.30	–0.471	0.638
	1 disease	–510.71	779.40	–0.663	0.513
	2 diseases	0	–	–	–
Parity	1	–219.53	469.33	–0.472	0.640
	2	1 050.06	438.41	2.40	0.017
	3	698.40	409.94	1.70	0.089
	4	356.44	377.77	0.947	0.346
	others	0	–	–	–
Sire line	DLL 001	–321.41	497.70	–0.653	0.519
	HRA 001	–83.1	491.32	–0.178	0.866
	HRA 003	–569.61	456.65	–1.25	0.213
	HRA 004	–215.60	578.98	–0.375	0.710
	HRA 007	–596.79	441.44	–1.35	0.177
	HRA 012	–98.1	492.27	–0.201	0.842
	HRA 512	134.90	578.98	0.23	0.816
	HW 047	–348.64	387.49	–0.906	0.369
	HW 048	–893.99	467.75	–1.91	0.057
	MAF 038	–1 039.48	661.47	–1.57	0.117
	others	–169.46	542.27	–0.312	0.755
	RMN 023	–554.01	583.38	–0.955	0.343
	WLD 001	238.39	608.24	0.393	0.695
	WLE 012	0	–	–	–

SE = standard error

https://doi.org/10.17221/122/2025-CJAS

Table S4. Least squares means for fat percentage with effects of disease status, lactation order and sire line

Model		Fat (%)			
R^2		0.074			
P-value		0.002			
Factor	Category	Estimate	SE	*t*-value	*P*-value
Disease occurrence	intercept	4.17	0.232	17.9	<0.001
	healthy	–0.020	0.180	–0.112	0.911
	1 disease	–0.067	0.183	–0.372	0.714
	2 diseases	0	–	–	–
Parity	1	0.113	0.110	1.03	0.305
	2	0.030	0.103	0.293	0.771
	3	0.010	0.096	0.118	0.911
	4	–0.028	0.089	-0.312	0.756
	others	0	–	–	–
Sire line	DLL 001	0.164	0.117	1.40	0.161
	HRA 001	0.273	0.116	2.37	0.018
	HRA 003	0.079	0.107	0.652	0.518
	HRA 004	0.309	0.136	2.27	0.024
	HRA 007	0.206	0.104	1.99	0.047
	HRA 012	0.190	0.116	1.65	0.100
	HRA 512	0.013	0.136	0.107	0.921
	HW 047	0.035	0.091	0.395	0.700
	HW 048	0.217	0.110	1.98	0.049
	MAF 038	–0.129	0.155	–0.833	0.405
	Others	0.067	0.127	0.524	0.600
	RMN 023	0.275	0.173	2.01	0.045
	WLD 001	0.211	0.143	1.48	0.139
	WLE 012	0	–	–	–

SE = standard error

https://doi.org/10.17221/122/2025-CJAS

Table S5. Least squares means for protein percentage with effects of disease status, lactation order and sire line

Model		Protein (%)			
R^2		0.109			
P-value		<0.001			
Factor	Category	Estimate	SE	*t*-value	*P*-value
Disease occurrence	intercept	3.91	0.120	32.7	<0.001
	healthy	–0.146	0.093	–1.56	0.119
	1 disease	–0.205	0.094	–2.17	0.030
	2 diseases	0	–	–	–
Parity	1	–0.154	0.057	–2.70	0.007
	2	–0.096	0.053	–1.81	0.071
	3	–0.077	0.050	–1.56	0.120
	4	–0.034	0.046	–0.747	0.462
	others	0	–	–	–
Sire line	DLL 001	–0.065	0.060	–1.08	0.281
	HRA 001	–0.084	0.059	–1.42	0.157
	HRA 003	–0.139	0.055	–2.52	0.012
	HRA 004	0.109	0.070	1.55	0.122
	HRA 007	–0.160	0.053	–2.99	0.003
	HRA 012	0.057	0.060	0.961	0.340
	HRA 512	0.010	0.070	0.155	0.884
	HW 047	–0.028	0.047	–0.528	0.554
	HW 048	–0.022	0.057	–0.382	0.702
	MAF 038	–0.265	0.080	–3.31	0.001
	others	–0.176	0.066	–2.69	0.008
	RMN 023	–0.102	0.071	–1.44	0.151
	WLD 001	–0.144	0.074	–1.96	0.051
	WLE 012	0	–	–	–

SE = standard error

https://doi.org/10.17221/122/2025-CJAS

Table S6. Least squares means for lactose percentage with effects of disease status, lactation order and sire line

Model		Lactose (%)			
R^2		0.169			
P-value		<0.001			
Factor	Category	Estimate	SE	*t*-value	*P*-value
Disease occurrence	intercept	4.88	0.090	54.4	<0.001
	healthy	–0.084	0.070	–1.20	0.233
	1 disease	–0.114	0.071	–1.61	0.107
	2 diseases	0	–	–	–
Parity	1	0.081	0.043	1.89	0.059
	2	0.041	0.040	1.02	0.307
	3	–0.010	0.037	–0.276	0.785
	4	0.006	0.034	0.164	0.870
	others	0	–	–	–
Sire line	DLL 001	0.050	0.045	1.12	0.264
	HRA 001	0.035	0.045	0.784	0.436
	HRA 003	0.021	0.041	0.501	0.617
	HRA 004	–0.009	0.053	–0.173	0.866
	HRA 007	–0.030	0.040	–0.758	0.455
	HRA 012	0.018	0.045	0.395	0.694
	HRA 512	0.052	0.053	0.991	0.323
	HW 047	0.035	0.035	1.01	0.313
	HW 048	0.017	0.042	0.409	0.691
	MAF 038	–0.116	0.060	–1.94	0.054
	others	–0.094	0.049	–1.91	0.056
	RMN 023	–0.087	0.053	–1.65	0.100
	WLD 001	–0.054	0.055	–0.994	0.325
	WLE 012	0	–	–	–

SE = standard error

https://doi.org/10.17221/122/2025-CJAS

Table S7. Least squares means for lactation persistency index with effects of disease status, lactation order and sire line

Model			LPI		
R^2			0.094		
P-value			0.001		
Factor	Category	Estimate	SE	*t*-value	*P*-value
	intercept	93.7	6.44	14.6	<0.001
Disease occurrence	healthy	–7.34	4.98	–1.48	0.141
	1 disease	–6.23	5.05	–1.23	0.218
	2 diseases	0	–	–	–
Parity	1	2.99	3.14	0.955	0.342
	2	–0.667	2.93	–0.236	0.820
	3	–2.21	2.75	–0.814	0.421
	4	–5.32	2.55	–2.09	0.037
	others	0	–	–	–
Sire line	DLL 001	–1.86	3.25	–0.578	0.568
	HRA 001	–0.287	3.21	–0.092	0.929
	HRA 003	–1.73	2.98	–0.589	0.563
	HRA 004	–5.21	3.74	–1.40	0.163
	HRA 007	–3.24	2.95	–1.10	0.272
	HRA 012	–0.445	3.18	–0.143	0.889
	HRA 512	2.30	3.74	0.612	0.539
	HW 047	1.47	2.53	0.588	0.563
	HW 048	–0.982	3.09	–0.322	0.752
	MAF 038	–0.438	4.41	–0.109	0.923
	others	2.42	3.54	0.681	0.494
	RMN 023	–1.16	3.85	–0.308	0.763
	WLD 001	–0.851	3.99	–0.214	0.831
	WLE 012	0	–	–	–

LPI = lactation persistency index; SE = standard error

https://doi.org/10.17221/122/2025-CJAS

Table S8. Difference in mean values of milk traits in retained and culled cows across overall health-status categories

	Milk yield					
	culled		retained		difference	
	$\bar{x}$	SD	$\bar{x}$	SD	culled -retained	*P*-value
Healthy	5 066.79	2 551.31	7 185.53	1 631.42	–2 118.74	<0.001
1 disease	6 634.67	2 183.67	7 634.98	1 842.07	–1 000.31	0.107
2 disease	5 283.83	3 301.08	5 905	2 222.90	–621.17	0.605
			Fat %			
Healthy	4.31	0.581	4.32	0.397	–0.012	0.823
1 disease	4.23	0.355	4.35	0.432	–0.124	0.382
2 disease	4.08	0.349	4.19	0.423	–0.108	0.601
			Protein %			
Healthy	3.50	0.364	3.60	0.215	–0.106	0.001
1 disease	3.54	0.348	3.51	0.226	0.034	0.728
2 disease	3.54	0.233	3.60	0.161	–0.067	0.460
			Lactose %			
Healthy	4.70	0.414	4.84	0.150	–0.146	<0.000 1
1 disease	4.76	0.158	4.80	0.217	–0.044	0.529
2 disease	4.74	0.143	4.76	0.196	–0.023	0.788
			LPI			
Healthy	85.9	21.7	85.4	11.5	0.477	0.815
1 disease	80.8	14.8	86.5	8.73	–5.74	0.102
2 disease	103.91	18.94	83.4	8.20	20.6	0.006

LPI = lactation persistency index; SD = standard deviation