ANALYSIS OF REPRODUCTIVE PERFORMANCE, MILK COMPOSITION AND QUALITY OF INDIGENOUS COWS: LITHUANIAN LIGHT GREY AND WHITE BACKED

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Abstract. Lithuanian farm animal genetic resources have a selective, economic, scientific, ecological, cultural, and historical importance to the Republic of Lithuania, and are an important part of global biodiversity. In Lithuania, now we have more than 20 cattle breeds of which 4 breeds are local: Lithuanian Black and White, Lithuanian Red (modern breeds), Lithuanian Light Grey and Lithuanian White Backed (indigenous). However due to the rapid agricultural development, highly productive and specialized cattle supplanted local breeds, which appeared on the verge of extinction. Only after forming relict gene-stocking herds and starting to breed by pure breeding, indigenous breeds were retained (Baltrėnaitė et al., 2003). As the old indigenous cattle breeds were poorly studied, our research was directed to analyze changes of reproductive performance and productivity parameters of indigenous, Lithuanian Light Grey and White Backed, cows. Data analysis showed that number of lactations of Light Grey and White Backed cows is higher than of Black and White and Red cows, moreover their average age at firs calving is less and calving interval is shorter, that means indigenous cows are productive for a longer time period. The average milk yield of Light Grey cows is quite high (15.442 kg) and is close enough to milk yield of the most productive (16.035 kg) Black and White cows. Milk of Light Grey and White Backed cows is characterized by high level of milk protein (3.406 and 3.408 % respectively) and less fat (4.134 and 4.320 % respectively). The average amount of Light Grey and White Backed cows' milk protein and fat is influenced by lactation period. Whereas calving season has an impact on milk yield, milk protein, fat and somatic cells count of both indigenous breeds.

Keywords: indigenous; cows; reproduction; milk; productivity

Introduction. As cattle breeding becomes more intensive, more productive and specialized, new breeds gradually replace the old local breeds. Many old breeds are facing extinction and genetic variability in small populations is restricted by inbreeding and genetic drift (Čítek et al., 2006; Deepika, Salar, 2012). Though cattle in Lithuania were improved intensively with different white and black or red bulls, there still are bulls and cows of indigenous colors and characteristics: Lithuanian White Backed (WB), and Lithuanian Light Grey (LG). The old type of Lithuanian Red (R) is also assigned as native breed (Jurkšaitienė, 2010). Indigenous cattle have economically useful characteristics and transfer them to offspring. Those breeds have high adaptation and resistance; they are undemanding, tame and produce milk of high quality (Deepika, Salar, 2012; Adamska et al., 2014). Currently, two major cattle breeds kept in Lithuania are BW and R cattle accounting for 66 % and 30 % respectively of all cattle (Christensen et al., 2003). Indigenous cattle were kept only by private owners and bred without any breeding system for a long time. Because of permanent spontaneous breeding of WB and LG cows with Lithuanian Black-and-white (BW) or Red bulls, indigenous cattle appeared on a verge of extinction (Baltrėnaitė et al., 2003).

In 1992, many countries including Lithuania signed The Rio de Janeiro Convention on biological diversity and committed to retain national genetic recourses. There were only several native breeds left in Lithuania, therefore in case to retain gene stock of those cattle, in 1993–1995, relict gene-stocking herds have been started to form. It is unlikely that indigenous cattle with primal characteristics could have been found because of their breeding with foreign bulls. After expeditions to outer country side and finding of vestigial cattle, herds of Lithuanian WB and LG cattle were formed. Those breeds were assigned as protective globally by Food and Agriculture Organization (FAO). Lithuanian WB cattle breed was recognized as unique and was included into Catalog of Diversity of World Agricultural Animals (Word Watch List). Therefore, cattle of those herds were started to breed only by pure breeding. Now not only the semen of males and DNA samples are stored, but also genetic characterization of these breeds using DNA and biochemical markers are done (Baltrėnaitė et al., 2003). Principal component analysis, suggests the hypothesis that native Lithuanian WB and LG breeds still have traits tracing to old native populations (Pečiulaitienė et al., 2007).

As environmental conditions, keeping and feeding systems change, reproductive parameters and milk composition indices of milking cows change as well. Therefore, analysis of such parameters have both theoretical and practical use. The productive life of a dairy cow is an indicator of her utility and is influenced by her age at first calving, calving intervals, length of each lactation, and milk yield and quality. Age at first calving includes the period for the cow to reach maturity and to reproduce for the first time; calving intervals reflect the periods for the cow to reproduce again (Zadech, 2011). Dairy cows that fail to conceive are destined for early culling (Nor et al., 2014). The main indicator of cow's health and milk quality, which is assessed routinely in milk of each cow under the Program of Animal Productivity Control in Lithuania, is somatic cell count. It reflects not only cow's health but also has an impact on the involuntary culling rate of cows (Sasaki, 2013). It has long been known that each trait is influenced extensively not only by environmental and physiological factors, but also by farming manner and dairy management practices, which have impacts on all dairy animal performance measurements including growth, health, reproduction, and lactation (Ruiz-Sanchez et al., 2007; Lievaart et al., 2007).

It has also been reported that these indicators of reproductive success and production quality has an impact on the economical outcome of the dairy enterprise (Gröhn, Rajala-Schultz, 2000), therefore an estimation of the main factors influencing dairy herd life and productivity and assessment of strength of their impacts are of high importance in every agricultural country. Besides. the influence of reproductive parameters on milk composition indices of Lithuanian indigenous cows was not analyzed before.

Indigenous breeds are meaningful not only for biological variety. They are a part of Lithuanian culture and agricultural heritage, important for variety of landscape and historical data. As the old indigenous cattle breeds are rarely studied farmers have little information. Therefore they are not motivated to breed these cows, thinking that it is not useful economically. Our research was directed to analyze changes of reproductive performance, milk composition and quality parameters of Lithuanian Light Grey and White Backed cows, comparing these parameters with those of most common modern Lithuanian breeds: Lithuanian Red and Black and White and to prompt cattle breeders to increase the number of these cows.

Material and methods. Lactation records (1301.571) from the certified Lithuanian dairy database were used to determine calving ages and intervals across time within breed for R, BW, WB and LG. Prior to statistical analyses, observations were checked for unlikely values; no data were excluded for this reason. The study was conducted from 2011 to 2013. Lactations of all cows that calved during the study period and completed 305-d lactation were included into analysis. Statistical analyses were performed using the SPSS statistical package (Ver.17.0, 2006; SPSS Inc., Chicago, IL, USA), Descriptive analysis, Analysis of variance, and the General linear model (GLM) procedures.

ANOVA method was used to estimate the differences between reproductive indicators (calving age (CA, d), calving interval (CI, d), age at first calving (AFC, d), calving month, number of lactations (NL), duration of lactation (DL, d)) and cow's performance indicators (milk yield (kg), milk fat (%), milk protein (%), somatic cells count (SCC, thou/ml), converted into lg SCC) within breed. Calving age was calculated as the difference between birth date and first calving date of the cow and normally was restricted to 450 d to 900 d. Calving interval was calculated as the difference between calving dates from successive parities and normally was restricted to 270 to 600 d. Age at first calving (AFC) was calculated as the difference between birth date and first calving date of the cow and normally was restricted to 540 d. to 1200 d. DL was calculated deducting calving date from dry off date. Milk yield was assessed during the individual control milking. Milk samples were taken during the evening milking from each individual cow by the sampling rules (BS EN ISO 707:1999 + S: 2003 Milk and milk products. Sampling rules). Samples were assessed for the percentage of milk fat and protein by Lacto Scope FTIR (FT1.0. 2001; Delta Instruments, The Netherlands, Mid-Infrared (IR) method) and somatic cell count (SCC) by SomaScope (CA-3A4, 2004, Delta Instruments, The Netherlands, Fluoro-opto-electronic method). The cow's performance parameters were estimated by a State laboratory "Pieno tyrimai" (Milk Tests).

Dispersive analysis (GLM) was performed in order to evaluate the influence of reproductive indicators (parity, age at first lactation, lactation period and calving season) on milk yield, composition and quality of WB and LG cows. To asses the influence of reproductive parameters they were grouped into the categories: AFC (18–24 months (540–730 days); 24 months (730 days); 25–26 months (760–790 days) and more than 26 months (790 days), parity (primiparous and multiparous cows), lactation period (early – 13–32 days, middle – 103–153 days, late – 162–215 days, dry off – 247–266); CS (spring, summer, autumn, and winter). The differences between the groups and factors were analyzed using the Bonferoni method of multiple comparisons. The differences were regarded to be statistically significant when $P \leq 0.05$.

Results and Discussion. Knowledge of the correlations between different characteristics of analyzed cattle has great practical importance for selection of the biological material (Anskiene et al., 2014). As it can be seen in Table 1, the average NL of indigenous breeds was higher, however the averages of DL, AFC and milk fats were lower than of BW and R cows.

AFC is one of the main indicators of reproductive performance of cows (Gulinski et al., 2003). AFC of our cows analyzed was signally less than indicates Szewczuk et al. (2013), who has found, that cows, imported from Sweden calved earlier (845.69 d.) compared with domestic cows (906.91 d.). The best age for the first calving is at 23–24 months (Ruiz-Sanchez et al., 2007; Wathes et al., 2014), therefore, LG and WB cows were closer to that age (26.5 and 26.8 months respectively) than R (28.2 months) and BW (28 months) cows. No significant difference was found among breeds for CI in our study.

Milk yield is the most important trait in dairy cattle production and total yield in 305 days is often used in genetic evaluation of animals (Amasaib et al., 2008). The least milk yield was of WB (14.759±6.039) cows and the highest – of BW (16.035±5.963), however milk yield of LG cows was quite high (15.442±6.017). The maximal milk yield of R (50.7 kg) and BW (64.09 kg) was almost twice as high as that of cows of indigenous breeds: WB and LG (38 kg and 35 kg respectively). However milk recording data shows that the milk yield and milk quality traits of LG and WB cows is no lower than the average milk yield in Lithuania. Productivity of LG and WB cows is registered to be 4489 kg (4.35 % of fat and 3.26 % of protein) and 4577 kg (3.98 % of fat and 3.26 % of protein), respectively (Baltrėnaitė et al., 2003). Milk productivity analysis shows that during thr period 2004–2010 the productivity of WB and LG cows increased by 272 and 407 kg respectively (Anskienė et al., 2012). Furthermore, it was determined that productivity of WB and LG cows was higher on average from 483 to 2538 kg comparėd with productivity of indigenous and vanishing cows of other countries (Sided Tronder and Nordland, Telemark, Dola, Western Red Polled, Western Fjord, Estonian native, Latvian Blue, Polish Red, Abodance).

Milk protein is the most valuable constituent of milk and currently is one of the economically most important dairy cattle signs in selection (Zamani et al., 2011). The highest average of milk protein was assessed in milk of R cows; however the amount of milk protein in LG and WB cows differed only by 0.1 %.

Fat is the second milk constituent that determines milk nutritional value and technological usefulness (Barłowska et al., 2009). The highest amount of milk fat was assessed in milk of R cows as well, but the amount of fat in milk of LG and WB cows was lower only by 0.4% and 0.2% respectively (Tab. 1).

The results of other researchers show good composition of WB and LG cows' milk as well. During the period 2004–2010, the average milk protein of WB and LG cows ranged from 3.29 to 3.35 % whereas milk fat ranged from 4.14 to 4.37 % (Anskienė et al., 2012). Comparing with the results of V. Juškienė (2001), the average milk fat and protein of WB cows since 2001 increased by 0.04 % and 0.17 % respectively, whereas the average milk fat of LG cows decreased by 0.19 % and the average milk protein increased by 0.19 %.

Table 1. **Descriptive statistic's results of Lithuanian Red** (R), **Black and White** (BW), **Light Grey** (LG) **and White Backed cows' performance**

Index	Breed	Mean ± st. dev.	Min	Max
Number of lactations	R	3.439±2.301 ^{LG,WB,BW}	1	16
	BW	3.913±2.571 $^{LG, WB, R}$	1	19
	LG	4.369±2.789 $^{BW, R}$	1	13
	WB	4.368±2,972 $^{BW, R}$	1	17
Duration of lactation, d.	R	341.350±72.42*	241	772
	BW	343.802±77.0*	240	758
	LG	325.198±60.505*	243	669
	WB	337.651±76.739*	240	659
Calving month	R	5.298±3.260*	1	12
	BW	4.858±3.029*	1	12
	LG	4.966±3.093*	1	12
	WB	4.4±3.1*	1	12
Age at first calving, d.	R	844.518±152.017 $^{LG, WB}$	541	997
	BW	840.049±159.657 $^{LG, WB}$	540	999
	LG	796.351±133.494 $^{BW, R}$	581	930
	WB	802.0±130.303 $^{BW, R}$	540	932
Calving interval, d.	R	360.582±35.033	273	532
	BW	359.636±34.746	341	530
	LG	357.233±31.707	281	446
	WB	348.925±33.03	288	424
Milk yield, kg	R	15.098±5.809*	2.09	50.70
	BW	16.035±5.963*	2.03	64.09
	LG	15.442±6.017*	2.5	35
	WB	14.759±6.039*	2.1	38
Milk fat, %	R	4.589±0.007 $^{LG, WB}$	3.94	6.31
	BW	4.402±0.009 $^{LG, WB}$	3.76	6.12
	LG	4.134±0.929 $^{BW, R}$	3.62	6,19
	WB	4.320±1.018 $^{BW, R}$	3.70	5.99
Milk protein, %	R	3.572±0.498 $^{LG, WB, BW}$	3.22	4.45
	BW	3.425±0.005 $^{R, WB}$	3.09	4.28
	LG	3.406±0.463 ^{R}	3.07	4.30
	WB	3.408±0.495 ^{R}	3.08	4.23

* Differences between breads index are statistically reliable, $p \leq 0.05$. Differences between letters $^{BW, R, LG, WB}$ are statistically reliable, $p \leq 0.05$. R (N=318722), BW (N=978782), LG (N=2179), WB (N=1889) cows

Although genetic factors have a significant influence on milk protein and milk fat, its improvement in many populations is difficult because of the unfavourable correlation with cow's productivity (Oberauskas et al., 2004).

When analyzing the size of cattle farms we noticed, that LG cows are kept only in medium size (6.2 %) or large private farms (93.8 %, Table 2). A lot of cattle breeders value them for the easy adaptation to environment, feeding and keeping, good health, calm temper, good quality of milk and vitality (Malevičiūtė et al., 2003). There are no registered small farms of WB cows in Lithuania as well. These cattle are kept (92.9 %) mostly on large farms. Little R cows (12 %) are kept on small and very small farms, some on medium size farms (about 21 %) and most of them (66.7 %) on large farms. Owners of large farms are more prone to choose BW cows (85.7 %) because of their high productivity. These numbers show that BW and R breeds are still the most popular in Lithuania.

Analyzing the influence of reproductive factors on milk yield, composition and quality parameters of LG and WB cows, we estimated, that all tested reproductive factors had an influence on productivity of both breeds (Tab. 3).

Amount of milk fat and milk protein of both breeds was influenced by lactation period. The number of lactations was detected to be an important factor, influencing the amount of WB cows‘ milk fat, whereas the amount of milk fat of LG cows was influenced by AFC. AFC is a significantly important factor for SCC in LG cows‘ milk as well. It was estimated, that calving season was significant for milk yield and SCC in milk of both breeds (Tab. 3).

Milk yield of LG (Tab. 4) and WB (Tab. 5) cows in early lactation (13–32 d.) is higher if compared with other lactation periods, i.e., the least milk productivity is during dry off (247–266 d.). In second half of lactation, when milk yield decreases (just before drying off (247–266 d.)) the amount of milk fats and proteins increases.

Table 2. **Number of cows** (%) **in different size farms**

Farm size, n	BW		R		WB		LG	
1–5	16612	1.7	20826	6.4	-	-	-	-
6–10	31169	3.1	19574	6.0	1	0.8	-	-
11–50	93876	9.5	67891	20.9	13	6.2	14	6.2
More than 50	848947	85.7	217225	66.7	156	92.9	188	93.8
In total:	990604	100	325516	100	170	100	202	100

Table 3. **Influence of reproductive factors on milk yield, composition and quality of Lithuanian Light Grey** (LG) **and Lithuanian White Backed** (WB) **cows** (factors are considered as statistically significant, when p<0.05. If p>0.05 – factors are eliminated from the model (N))

Factors*	Milk yield, kg		Milk fat, %		Milk protein, %		SCC, thou/ml	
	LG	WB	LG	WB	LG	WB	LG	WB
Lactation period	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	N	N
Number of lactations (cow age)	0.0002	0.021	N	0.0121	N	N	0.022	0.007
Age at first calving	0.028	0.001	0.003	N	N	N	0.009	N
Calving season	0.0001	0.0001	N	N	N	N	0.001	0.0001
* Interactions of factors are not statistically significant								

AFC is also an important factor, influencing cow’s productivity. We estimated LG cows as most productive, which calve young (18–24 months) or older (>26 months). AFC of Lithuanian cows is quite low if compared with local Estonian cows. AFC of Estonian Reds is 960 days and calving interval reaches 397.8 days. In case of the high age at first calving as well as long calving interval total lifetime productivity is lower than of those, who calve earlier (Järv et al., 2003).

Milk of LG cows, which calve 2 years old, is the most rich in fat. SCC is higher in milk of older LG cows (AFC ≥ 25 months). Milk productivity of WB cows is the highest in middle age cows (AFC = 24–26 months) and the least in older (AFC > 26 months) cows. The highest fat content is found in the milk of primiparous WB cows.

The number of lactations (cows age) has an influence on milk yield and SCC in milk of LG and WB cows. Primiparous cows produce less milk than older ones; otherwise, SCC in milk of young cows is lower. This could be explained by the fact, that the udder of older cows is localized nearer the ground. The less distance is from udder to ground, the higher SCC is found in milk of such cows (Bhutto et al., 2010). Similar results were published by Estonian researchers who state, that the lactation number as well as cow’s age appeared to be significant to somatic cell count in milk of Estonian Red cows (P<0.01) (Kiiman et al., 2003). Wellness of teats correlates with SCC as well: if canals of teats are wounded, the higher is the probability to find more SCC in milk. Teat canal muscle of older cows is weaker what gives easier access to the udder tissue (Ouweltjes et al., 2007).

Various reports indicate that calving season play an essential role in most of the productive traits in dairy animals. For instance, Crossbreed kenana x Fresian cows, the wet season calvers, produce more milk and have the longest lactation period in Sudan compared to cows, calving in the summer (Amasaib et al., 2008). However many authors assume calving season as one not influencing the productivity of well fed and handled cows. In most farms, however, conditions of cows fed and housed during different seasons are not alike. In farms with less feeds and disrepaired cowsheds, cows are the most productive if they calve in the late autumn or in the winter. Then the second half of lactation coincides with grazing period and cows give by 10–20 % of milk more than those, which calve during the summer. The most productive are those cows that calve from February to April, then the most intensive lactation time coincides with the beginning of grazing period. The least milk productivity is of those cows, which calve from June to August (Campbell et al., 2013). According to our results, calving season has an influence on milk yield and SCC in LG and WB cows. Cows, calving in the winter produce more milk than those that calve during other seasons. The highest SCC is found in milk of LG cows that calve in the summer; the lowest SCC was found in milk of cows, which calved in the autumn. The least amount of fats and proteins was estimated in milk of WB cows, which calved in the winter, whereas the SCC was higher in milk of WB cows, which calved in the autumn. However in Lithuania there is a lack of data about the seasonal impact on cows' productivity indices.

Table 4. **Variations in milk yield, milk composition and quality indexes of Lithuanian Light Grey cows depending on reproductive performances**

Lactation period	N	Milk yield, kg	Milk fats, %	Milk proteins, %	SCC, thou/ml
1 (13-32 d.)	126	18.797±0.579 ^{2,3,4}	3.942±0.094^{3,4}	3.383±0.027^{2,3,4}	393.983±53.078
2 (103-153 d.)	353	15.860±0.419 ^{1,3,4}	3.956±0.068^{3,4}	3.138±0.046^{1,3,4}	269.577±92.307
3 (162-215 d.)	414	12.953±0.400 ^{1,2,4}	4.274±0.065^{1,2,4}	3.249±0.034^{1,2,4}	341.574±66.782
4 (247-266 d.)	137	9.106±0.558 ^{1,2,3}	4.819±0.091^{1,2,3}	3.430±0.032^{1,2,3}	321.495±63.783
Age at first calving (AFC)					
1 (<24 months)	137	13.360±3.954^{2}	4.219±0.799^{2,4}	3.353±0.443	251.927±40.787^{3}
2 (24 months)	8	8.475±2.746^{1,4}	5.102±0.421^{1,3}	3.489±0.229	54.556±19.497
3 (25-26 months)	49	13.015±3.582	4.179±0.884^{2}	3.244±0.379	616.776±153.550^{1,4}
4 (>26 months)	186	13.454±5.547^{2}	4.508±0.995^{1}	3.385±0.465	359.220±53.644
Number of lactations (NL)					
1 (primiparous cows)	424	12.971±0.434*	4.276±0.071	3.368±0.035	229.495±69.311*
≤2	563	15.341±0.482*	4.221±0.078	3.403±0.039	460.274±76.948*
1 (<700 d.)	82	14.953±0.672	4.315±0.109^{2}	3.388±0.054	342.261±107.162
2 (700-750)	91	13.348±0.650	4.029±0.106^{1,3}	3.391±0.052	223.270±103.723^{3}
3 (>750 d.)	251	14.167±0.271	4.402±0.044^{1,2}	3.378±0.022	469.122±43.175^{2}
Calving season (CS)					
1 (spring)	1041	14.571±0.358^{2}	4.297±0.058	3.402±0.029	337.814±57.163^{2}
2 (summer)	324	13.205±0.441^{1,4}	4.208±0.072	3.386±0.035	513.520±70.365^{1,3,4}
3 (autumn)	195	13.812±0.492^{4}	4.261±0.080	3.346±0.039	238.126±78.520^{2}
4 (winter)	619	15.035±0.385^{2,3}	4.229±0.063	3.408±0.031	290.078±61.501^{2}
Explanation: differences between superscripts $^{1-4}$ and * are statistically significant (p≤0.05)					

Table 5. **Variations of Lithuanian White Backed cows' milk yield, milk composition and quality indexes depending on reproductive performances**

Lactation period	N	Milk yield, kg	Milk fat, %	Milk protein, %	SCC, thou/ml
1 (13-32 d.)	109	17.539±1.368 ^{2,3,4}	4.289±0.259^{3,4}	3.537±0.125^{3,4}	538.119±239.746
2 (103-153 d.)	268	15.217±1.458^{1,3,4}	4.242±0.248^{3,4}	3.576±0.120^{3,4}	480.022±256.352
3 (162-215 d.)	336	12.475±1.4^{1,2,4}	4.694±0.245^{1,2,4}	3.782±0.118^{1,2,4}	484.488±245.623
4 (247-266 d.)	128	8.625±1.449^{1,2,3}	5.014±0.257^{1,2,3}	4.018±0.124^{1,2,3}	529.747±242.512
Age at first calving (AFC)					
1 (<24 months)	103	13.312±4.027^{4}	4.384±1.165	3.425±0.562	348.223±57.152
2 (24 months)	8	15.45±3.716^{4}	3.473±0.442^{3}	3.044±0.411	348.223±87.131
3 (24-26 months)	14	15.454±4.358^{4}	4.784±0.487^{2}	3.429±0.298	294.0±91.668
4 (>26 months)	151	11.673±5.169^{1,2,3}	4.466±1.006	3.474±0.480	276.857±58.166
Number of lactations (NL)					
1 (primiparous cows)	352	12.765±1.359*	4.716±0.244*	3.770±0.118	384.099±241.161*
≤2	991	14.301±1.428*	4.419±0.255*	3.685±0.123	696.636±252.589*
Calving season (CS)					
1 (spring)	837	14.932±1.367 ^{2,3}	4,553±0,242	3.749±0.117^{4}	527.658±239.900^{3,4}
2 (summer)	249	12.786±1.409 ^{1,4}	4.686±0.250^{4}	3.741±0.121	493.974±247.279 ^{3}
3 (autumn)	152	11.918±1.435 ^{1,4}	4.518±0.254	3.723±0.123	770.857±251.599^{1,2,4}
4 (winter)	651	15.073±1.375 ^{2,3}	4.513±0.244^{2}	3.698±0.118^{1}	368.981±241.216^{1,3}
Explanation: differences between superscripts $^{1-4}$ and * are statistically significant (P≤0.05)					

Conclusions. Data analysis showed that the number of lactations of LG and WB cows is higher than of BW and R cows, moreover their average AFC is less and CI is shorter, that means indigenous cows are productive for a longer time period. The average milk yield of LG cows is quite high (15.442 kg) and is close enough to milk yield of the most productive (16.035 kg) BW cows. Milk of LG and WB cows is characterized by high level of milk protein (3.406 and 3.408 % respectively) and less fat (4.134 and 4.320 % respectively). Milk yield, protein and fat content of both LG and WB cows' is influenced significantly by lactation period as well as by calving season.

As reproductive and productivity traits of indigenous cows (LG and WB) are close to modern breeds (BW and R), the Lithuanian Light Grey and White Backed cattle breeds could be preserved retaining their individual characteristic complex of qualities.

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