Body Weight Evolution of Tsurcana Pure Breed Lambs and Tsurcana Crossed with Blanc Du Massif Central Lambs (F1)

Ioan PAȘCA¹, Dana PUSTA¹, Liviu BOGDAN², Diana ZAGON², Anca GIURGIUMAN³, Alexandra TĂBARAN¹, Mihai Marian BORZAN^{1*}

¹Department of Animal Productions and Food Safety, USAMV Cluj, Romania

²Department of Clinics, USAMV Cluj, Romania

³S.C.Agrocons Parox SRL

*corresponding author: mihai_borzan@yahoo.com

Bulletin UASVM Veterinary Medicine 74(1) / 2017,

Print ISSN 1843-5270; Electronic ISSN 1843-5378

DOI:10.15835/buasvmcn-vm: 12432

Abstract

The Blanc du Massif Central breed is a rustically French meat breed of sheep that was used in crossing with Tsurcana breed in order to improve the quality of local lambs for the European market. After crossing, the resulting lambs were compared with purebred Tsurcana lambs to evaluate daily weight gain from birth to 3 months. The daily weight gain was superior in the crossed lambs compared with purebred lambs.

Keywords: *Blanc du Massif Central, body weight, daily weight gain, Tsurcana*

INTRODUCTION

In the EU market the demand for the local breed meat, such as Tsurcana breed, is low (FAO 2014; Belibasaki, 2012; Reports of the Romanian National Agency for Genetic Improvement and Reproduction in Animal Husbandry for the year 2010); so many breeders choose to cross the pure breed ewes with meat rams to improve the quality of the lambs (Pascal *et al.*, 2014) and so using the heterosis effect. The Blanc du Massif Central breed is a rustically French meat breed of sheep, and it was not used before in our country to produce F1 lambs for the market (Kukovics *et al.*, 2013).

The crossing of the Tsurcana breed with a French meat breed like Blanc du Massif Central is important to increase the quality of the resulting carcasses. The Blanc du Massif Central breed has never been used before in crossings with Romanian breeds.

This is an original research and presents preliminary data regarding the carcass characteristics of the hybrid lambs resulted from the crossing of the French sheep breed with the Tsurcana purebred.

The study has been carried out from summer 2015 to autumn 2016.

The aim of this study is to evaluate the body weight evolution of the resulted lambs F1 with the body weight evolution of the pure Tsurcana lambs, daily weight gain from birth to 3 months.

H₀ hypothesis = the body weight of the crossbred Tsurcana with Blanc de Massif Central and purebred Tsurcana lambs is equal, regardless of the moment when the weighting is performed (at birth, at 21, 50 and 90 days).

H₁ hypothesis = the body weight of the crossbred Tsurcana with Blanc de Massif Central and purebred Tsurcana lambs is different, re-

Fig 1. The share of crossbreds and purebreds lambs according to gender

regardless of the moment when the weighting is performed (at birth, at 21, 50 and 90 days).

MATERIALS AND METHODS

The research has been carried out on two selected Tsurcana batches. The first batch consisted on a flock of purebred Tsurcana lambs and the second one consisted on a flock of F1 lambs (Tsurcana ewes and BMC rams). The lambs were kept in similar conditions (nutrition, housing, etc). The body weight of the lambs was evaluated at birth, at 21, 50 and 90 days. The results were statistically evaluated using ANOVA test and t-Test, average and standard deviation.

The analysis regarded the daily weight gain, the comparative evaluation of body weight concerning the age, sex and purebred lambs with F1 crossed lambs (Dodouet 2003; Mireşan *et al.*, 1979).

RESULTS AND DISCUSSION

The BMC breed has never been used before in crossings with Tsurcana. This is an original research and presents preliminary data regarding the results of the crossings between Tsurcana breed crossed with BMC breed compared with the evolution of the purebred Tsurcana.

The research was conducted on 99 ewes that were divided in two batches.

The 50 Tsurcana ewes were synchronized and naturally mated with Blanc du Massif Central rams (batch I, test), 48 ewes were diagnosed as pregnant by ultrasound examination and only 46 crossed lambs resulted (the difference was recorded as abortion). From the second batch (control batch), 49 ewes were synchronized and naturally mated

with Tsurcana rams and 48 purebred lambs resulted (the difference was recorded as abortion).

All the pregnant ewes were assisted to parturition; the resulted lambs were weighted immediately after parturition and identified in the first day after birth.

The gender share for crossbred and purebreds lambs are almost equal, more than half were males (crossbreds 54.35%, respectively 54.17% to purebreds), and almost equal shares (45.65% Tsurcana crossbreds and 45.83% Tsurcana purebreds lambs) were females (fig 1).

Following the statistical analysis, we obtained superior results for the F1 crossed lambs compared with the purebred Tsurcana lambs concerning the daily weight gain and the body weight evolution between the two batches.

The average of body weight of crossbred lambs from the test batch (Tsurcana x BMC) are higher than those of purebred Tsurcana lambs from the control batch, regardless of the moment when the weighting is performed (at parturition, at 21, at 50 and 90 days). The data collected revealed that the male and female crossbreds from the testing batch recorded superior weights than the purebred males and females Tsurcana lambs from the control batch (table 1, fig 2, 3)

Concerning the body weight analysis at parturition of the control batch and the test batch, the ANOVA test revealed that $F > F_{crit}$, meaning $175.51 > 3.94$, so the hypothesis is rejected and the H_1 hypothesis is accepted according to which the body weight at parturition of the crossbred Tsurcana lambs are different that the weight of purebred Tsurcana lambs (table 2).

The t-Test confirmed that $t_{Stat} \geq t_{Critical}$ two-tail, ($13.04 \geq 2.00$), fact that reinforces the

Tab. 1. Average and standard deviation of the body weight of the Tsurcana crossbred with Blanc du Massif Central and Tsurcana purebred lambs at parturition, 21 days, 50 days, 90 days (kg)

Crossbred Tsurcana with Blanc du Masiff Central				
Body weight	Parturition (kg)	21 days (kg)	50 days (kg)	90 days (kg)
Total testing group	4,99±0,98	10,25±2,26	19,98±4,58	28,48±4,38
Males	5,07±0,97	10,35±2,13	20,65±4,63	28,40±4,60
Females	4,90±1,00	10,12±2,44	19,18±4,50	28,56±4,21
Tsurcana purebred lamb				
Body weight	Parturition (kg)	21 days (kg)	50 days (kg)	90 days (kg)
Total control group	2,96±0,40	7,69±0,84	15,35±1,61	23,90±2,02
Males	3,01±0,43	7,85±0,85	15,72±1,59	24,55±1,83
Females	2,90±0,36	7,51±0,82	14,90±1,55	23,15±2,01

Fig. 2. The body mass average evolution of Tsurcana crossbred and Blanc du Masiff Central and purebred Tsurcana lambs

Fig. 3. The body mass average evolution of male and female crossbred Tsurcana and Blanc du Masiff Central and Tsurcana purebred lambs

Tab. 2. ANOVA Test for body weight at parturition for Tsurcana purebreds and crossbreds

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Column 1	46	229,58	4,990869565	0,958199227
Column 2	48	142,22	2,962916667	0,15996578

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	96,60218354	1	96,60218354	175,5107579	4,83657E-23	3,944538679
Within Groups	50,63735688	92	0,550406053			
Total	147,2395404	93				

hypothesis that the body weight at parturition of the crossbred Tsurcana lambs are different that the weight of purebred Tsurcana lambs (table 3).

For the body weight of the lambs at 21 days the ANOVA test revealed that $F > F_{crit}$, in our case $53.66 > 3.94$, the H_0 hypothesis is rejected and the

H_1 hypothesis is accepted. The H_1 hypothesis states that the body weight at 21 days of the crossbred Tsurcana lambs with BMC is different to the weight of purebred Tsurcana lambs. (table 4)

The t-Test analysis revealed that $t_{Stat} \geq t_{Critical}$ two-tail, in our research $7.02 \geq 2.00$, that

Tab. 3. t-Test for body weight at parturition for Tsurcana purebreds and crossbreds

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	4,990869565	2,962916667
Variance	0,958199227	0,15996578
Observations	46	48
Hypothesized Mean Difference	0	
df	59	
t Stat	13,04614171	
P(T<=t) one-tail	2,4521E-19	
t Critical one-tail	1,671093033	
P(T<=t) two-tail	4,90419E-19	
t Critical two-tail	2,000995361	

Tab 4. ANOVA Test for body weight at 21 days for Tsurcana lambs with BMC and Tsurcana purebreds

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Column 1	46	471,3	10,24565217	5,086091787
Column 2	48	369,3	7,69375	0,709534574

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	152,9675318	1	152,9675318	53,66826283	8,86232E-11	3,944538679
Within Groups	262,2222554	92	2,850241907			
Total	415,1897872	93				

body weight at 21 days of the crossbreds Tsurcana lambs with BMC is different to Tsurcana purebreds lambs. (Table 5).

The statistical analysis with ANOVA single factor at 50 days for the lambs in the two batches revealed that $F > F_{crit}$, in our study being $43.43 > 3.94$ and confirms the hypothesis that the body weights of Tsurcana lambs is not equal to those of the purebred Tsurcana lambs. (table 6)

The t-Test at the data collected at 50 days reinforced the results obtained with ANOVA ($t_{Stat} \geq t_{Critical\ two-tail}$: $6.48 \geq 2.00$) (table 7).

The data collected at 90 days for the body weights of the lambs from the two batches were

analyzed with ANOVA and revealed that $42.80 > 3.94$ ($F > F_{crit}$) and confirms the hypothesis (H_1) that the body weight of the purebred Tsurcana lambs is different to those of crossbred Tsurcana with BMC lambs. The results obtained with ANOVA are confirmed also with t-Test: $t_{Stat} \geq t_{Critical\ two-tail}$ ($6.45 \geq 2.00$) (table 8, 9).

In the literature, there were no other similar studies to compare our results with. There are studies for the purebreds Tsurcana and purebred Blanc de Massif Central, or in crossings with other breeds, but this is the first research that records the results between the two breeds. The data recorded in the study for the purebred

Tab 6. ANOVA Test for body weight at 50 days for Tsurcana lambs with BMC and Tsurcana purebreds

Anova: Single Factor

SUMMARY

SUMMARY						
Groups	Count	Sum	Average	Variance		
Column 1	46	919	19,97826087	20,9884058		
Column 2	48	736,7	15,34791667	2,599570035		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	503,6139687	1	503,6139687	43,43705559	2,69663E-09	3,944538679
Within Groups	1066,658053	92	11,59410927			
Total	1570,272021	93				

Tab 5. t-Test for body weight at 21 days for Tsurcana lambs with BMC and Tsurcana purebredst-Test: Two-Sample
Assuming Unequal
Variances

	Variable 1	Variable 2
Mean	10,24565217	7,69375
Variance	5,086091787	0,709534574
Observations	46	48
Hypothesized Mean Difference	0	
df	57	
t Stat	7,20780897	
P(T<=t) one-tail	7,16659E-10	
t Critical one-tail	1,672028889	
P(T<=t) two-tail	1,43332E-09	
t Critical two-tail	2,002465444	

Tab. 7. t-Test for body weight at 50 days for Tsurcana lambs with BMC and Tsurcana purebredst-Test: Two-Sample
Assuming Unequal
Variances

	Variable 1	Variable 2
Mean	19,97826087	15,34791667
Variance	20,9884058	2,599570035
Observations	46	48
Hypothesized Mean Difference	0	
df	56	
t Stat	6,481063644	
P(T<=t) one-tail	1,24104E-08	
t Critical one-tail	1,672522304	
P(T<=t) two-tail	2,48208E-08	
t Critical two-tail	2,003240704	

Tab. 8. ANOVA Test for body weight at 90 days for Tsurcana lambs with BMC and Tsurcana purebreds

Anova: Single Factor

SUMMARY

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	490,9853292	1	490,9853292	42,805117	3,35962E-09	3,944538679
Within Groups	1055,262862	92	11,4702485			
Total	1546,248191	93				

Tab. 9. t-Test for body weight at 90 days for Tsurcana lambs with BMC and Tsurcana purebreds

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	28,47608696	23,90416667
Variance	19,18852657	4,080407801
Observations	46	48
Hypothesized Mean Difference	0	
df	63	
t Stat	6,45181273	
P(T<=t) one-tail	8,92586E-09	
t Critical one-tail	1,669402222	
P(T<=t) two-tail	1,78517E-08	
t Critical two-tail	1,998340522	

Tsurcana sheep were similar to those found by other researchers (Miresan *et al.*, 1979). For the crossbreds, the productions were superior compared with purebreds, but similar to other crossbreds with meat breeds used to enhance the meat production (Pascal *et al.*, 2014).

CONCLUSION

More than half of the lambs were males (54,35% crossbred lambs and 54,17% purebred lambs), and the share almost equals were females 45,65% crossbreds lambs and 45,83% of purebreds Tsurcana lambs.

There are statistical differences at $p=0.05$ between the weights at parturition, at 21, 50 and 90 days of crossbred Tsurcana with Blanc de Massif Central lambs and purebreds Tsigaia lambs.

Concerning the birth weights, at 21, 50 and 90 days the results showed a difference between the pure breed lambs and the crossed lambs. The daily weight gain was superior in the crossed lambs compared with purebred lambs. The research confirmed the superior weights of lambs obtained in the first generation between the BMC and Tsurcana breed.

Acknowledgements: This work has benefited from financial support through the PN-II-PT-

PCCA-2013-4-1239 project, No: 152/01.07.2014, "Obtaining the Romanian meat lamb - OVICARO".

REFERENCES

1. Belibasaki S, Sossidou EN, Gavojdian D (2012). Local Breeds: Can they be a Competitive Solution for Regional Development in the World of "Globalization"? The Cases of Greek and Romanian Local Breeds, Scientific Papers: Animal Science and Biotechnologies, 45 (2): 278-284.
2. Dodouet C (2003). La production du mouton, 2^e edition, Ed France Agricole, Paris.
3. FAO STATISTICAL YEARBOOK (2014). Europe and Central Asia Food and Agriculture, Food and Agriculture Organization of the United Nations Regional Office for Europe and Central Asia Budapest, E-ISBN 978-92-5-108168-6.
4. Kukovics S, Németh T, Lengyel A, Toldi G, Jávör A (2013). The Effects Of Genotype And Fattening Technology On Meat Producton Characteristics, Lucrări Științifice-Seria Zootehnie, vol. 59 (18).
5. Mireșan E, Pop A, Popa O (1979). Contribuții la cunoașterea aptitudinilor pentru producția de carne a raselor Merinos de Transilvania, Țigaie și Țurcană. Lucr.Șt. I.A.C.N., vol. 2: 143-146.
6. Pascal C, Nechifor I (2014). The effect of crossing romanian sheep breeds with rams of meat breeds over the specific indicators of meat production, Lucrări Științifice - Seria Zootehnie, vol. 61.
7. Reports of the Romanian National Agency for Genetic Improvement and Reproduction in Animal Husbandry for the year 2010, (2010). Retrieved on 5 March 2012 from: <http://www.anarz.eu /Anarz Administrator Site/ CMS Content/ RAPORT% 20DE% 20ACTIVITATE/ Raport>.