

BOOK OF PROCEEDINGS

**Sixth International Scientific Agricultural Symposium
“Agrosym 2015”**

AGROSYM 2015



Jahorina, October 15 - 18, 2015

Impressum

Sixth International Scientific Agricultural Symposium „Agrosym 2015“

Book of Proceedings

Published by

University of East Sarajevo, Faculty of Agriculture, Republic of Srpska, Bosnia
University of Belgrade, Faculty of Agriculture, Serbia
Mediterranean Agronomic Institute of Bari (CIHEAM - IAMB) Italy
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Website:

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CIP - Каталогизација у публикацији

Народна и универзитетска библиотека
Републике Српске, Бања Лука

631(082)(0.034.2)

INTERNATIONAL Scientific Agricultural Symposium "Agrosym
2015" (6 ; Jahorina)

Book of proceedings [Elektronski izvor] / Sixth International
Scientific Agricultural Symposium "Agrosym 2015", Jahorina,
October 15 - 18, 2015 ; [editor in chief Dušan Kovačević]. - East
Sarajevo =Istočno Sarajevo : Faculty of Agriculture =Poljoprivredni
fakultet, 2015. - 1 elektronski optički disk (CD-ROM) : tekst, slika ;
12 cm

CD ROM čitač. - Nasl. sa nasl. ekrana. - Bibliografija uz svaki rad. -
Registar.

ISBN 978-99976-632-2-1

COBISS.RS-ID 5461016

Original scientific paper
10.7251/AGSY15051151C

**TESTING CONSTITUTION AND REPRODUCTIVE POTENTIAL OF SVRLJIG
ZACKEL SHEEP FOR ORGANIC PRODUCTION IN EAST SERBIA**

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Abstract

Eastern Serbia region, especially Homolje territory is an important natural resource of a great potential for organic sheep production. Its long tradition of sheep breeding and the quality of lamb meat and dairy products has become well-known. Svrlijig type of Zackel sheep is traditionally reared in the hilly - mountain region of Eastern Serbia. It is well adapted to environmental conditions and sustainable breeding systems. Bearing in mind that autochthonous breeds are preferable for organic production due to the fact that they are well adapted to habitat and due to their genetic tolerance to diseases, the autochthonous Svrlijig sheep population reared in Homolje territory was chosen for this research. Examination of health status, body score condition, reproductive traits in a population of 342 ewes and growth traits of 412 lambs reared in sustainable livestock farming was performed. Reproductive and lamb growth traits, litter size at weaning (LSW), total litter weight at birth (TLWB), total litter weight at one-month (1TLMW) and total litter weight at weaning (TLWW) were analyzed. Results of health status, basic ewe reproductive traits and lamb growth performance show that autochthonous Svrlijig type of Zackel sheep has robust constitution and potential to be the breed of choice for organic production in the hilly - mountain region of Eastern Serbia.

Key words: *Zackel sheep, health status, production traits*

Introduction

One of the primary elements in the organization of organic production is the choice of suitable breeds. Each breed and strain of domestic animals were created through a process of interaction between genome and environment, along with adjustment imposed by man. According to the legal regulations of the methods of organic livestock production (2010), animal species and breeds that are adapted to local growing conditions and resistant to disease are envisaged to be used in organic production (Cojkić et al., 2014.; Savić et al., 2014). When choosing the animals, advantage is given to domestic (autochthonous) animal breeds and strains (Petrović et al., 2009.).

Autochthonous breeds, whose microevolution occurred under the influence of ambient selection factors represent a unique source of genetic variability that enable adaptation to the new conditions and may enable the survival of the population under adverse action of pathogenic microorganisms. Organic production legal regulations set high standards which specify the conditions for breeding animals in self-sustaining systems. Animal breeding is based on physiological and ethological needs of the animals. But from the economic aspect of production, it is important to evaluate the reproductive and production potential of the breed. Reproduction of animals in organic production is carried out through natural mating or artificial insemination. Other methods of biotechnology in reproduction such as embryo transfer, MOET and hormonal induction of estrus are not allowed.

Organic farming is a specific, innovative aspect of production, which brings significant innovations, especially the one relating to veterinary supervision. The regulation is quite strict when it comes to the prohibition of preventive treatment. Health care in organic livestock production is based on the principle of disease prevention. Legislation in this area emphasizes breeding of genetically resistant animals with the improvement of environmental conditions and care.

Economical use of well-adapted indigenous animals is achieved by preserving the diversity of domesticated animal species for the selection procedure and as a source of the gene pool that can confront unpredictable immune challenges.

A good adaptation of the animals to the local environmental conditions allows a maximal expression of their production potential. This is reflected in the quantity and quality of milk, meat, as well as reproductive features for a given species, breed or strain of animals. In sheep breeding the production is mainly focused on the production of meat. Consequently, the goal is to get a greater number of live, vital lambs per ewe, and for lambs to have some better feed conversion and therefore better growth.

This paper presents robustness-related traits of Svrljig type of Zackel sheep which are breeding in several municipalities of Eastern Serbia. The aim of this study was to investigate the potential of the locally adapted Zackel sheep, and the possibility of rational utilization and conservation of this strain of sheep as an important element for rural agro-economic development.

Materials and methods

Animals

In total, 342 ewes, 3 to 5 years old, and 412 lambs of Svrljig type of Zackel sheep breed, traditionally reared in Eastern Serbia, Homolje region, were examined for health status, body score condition, reproductive and lamb growth traits. The evaluation was performed during the winter and spring. During the spring and summer, the sheep were grazed on mountain natural pastures. On the other hand, during the autumn and winter the diet of ewes was based on hay and concentrate. The lambs remained with their mother until weaning at 90 days and fed ad libitum with hay and concentrate with 18% of protein.

Studied traits

Reproductive and lamb growth traits analyses included litter size at weaning (LSW), the sum of the birth weight of all lambs born per ewe lambed (TLWB- total litter weight at birth), the sum of the weights off all lambs on one month of age (1TLMW - total litter weight at 30 days) and the sum of the weights off all lambs weaned per ewe lambed (TLWW - total litter weight at weaning-90 days).

Statistical analysis

The software package Prism Pad v. 6.0 (Graph Pad Software Inc., San Diego, CA, USA) was used for statistical calculations. Reproductive and lamb growth traits were presented by descriptive statistical parameters. Student t-test was used to examine the differences of weight between male and female lambs, twins and single lamb of every measured period (TLWB, 1TLMW, TLWW).

Results and Discussion

The first stage in this study was the evaluating the body condition scoring of sheep. The results of this analysis have shown that all examined sheep were right BSC considering the stage of production.

Monitoring of sheep health carried out based on the Program of animal health protection measures. Based on that, animals are monitoring for Brucellosis (*B. melitensis*, *B. ovis*), transmissible spongiform encephalopathy (TSE) and the diagnostic tests in case of abortions. Percentage of abortions in the herd was not significant. No one abortion was not caused by infectious disease (brucellosis, leptospirosis, listeriosis, and Q fever). Analysis of the reproductive characteristics of Svrljig sheep shown regular fertility. Reproductive traits were in accordance with breed standards.

The results of the constitutional and reproductive traits of ewes as well as body weight of lambs at birth (TLWB), on 30 days (1TLMW) and 90 days (TLWW) are shown in Table 1.

Table 1. Summary of descriptive statistics for constitutional, reproductive and lambs growth traits.

	Lambs			Ewes	
	TLWB (kg)	1TLMW (kg)	TLWW (kg)	Body weight (kg)	LSW (lamb)
$\bar{x} \pm SE$	3.39 ± 0.03	8.90 ± 0.04	26.62 ± 0.11	56.25 ± 0.17	1.20 ± 0.02
SD	0.58	0.78	2.16	3.42	0.40
IV	2.0 – 4.7	6.9– 13.0	22.0 – 35.0	48.0 – 67.0	1.0 – 2.0
CV	17.28%	8.78 %	8.10%	6.09%	33.47 %

TLWB- total litter weight at birth, 1TLMW- total litter weight at one-month age, TLWW - total litter weight at weaning, LSW - litter size at weaning

The average TLWB, 1TLMW and TLWW were 3.39 kg, 8.90 kg and 26.62 kg, respectively. In the study of Caro Petrović et al. (2012), performed on the Svrljig type of Zackel sheep, the average birth weight of lambs and weight at 30 days was higher than in our study. On the other hand, the average weight of lambs at 90 days was lower. Indirect lamb selection based on TLWW could be efficient for the studied traits (Roshanfekar et al., 2015).

The mean body weight of ewes on lambing, measured was 56.25 kg. The result is in agreement with study which reported that birth weights of lambs depend on the weight of ewes (Petrović et al., 2011).

In this study litter size at weaning, LSW was 1.20, which is an agreement with Zackel breed characteristics. Differences in reproductive performance could be explained by many factors like genetics, maternal behavior of ewes at different ages, nursing and the differences in maternal effects (Roshanfekar et al. 2015).

The influence of sex of lamb, birth type and lambs` body weight are presented in this study.

Table 2. The differences in body weight of lambs, based on sex and birth type

	Male lamb (n=38)	Female lamb (n=374)	Singles (n=274)	Twins (n=138)
TLWB	4.14±0.39 ^{AA}	3.01±0.55 ^{AA}	3.76±0.27 ^{BB}	2.64±0.23 ^{BB}
1TLMW	10.14±1.22 ^{AA}	8.78±0.60 ^{AA}	9.05±0.79 ^{BB}	8.60±0.67 ^{BB}
TLWW	30.73±2.72 ^{AA}	26.14±2.00 ^{AA}	26.66±3.01	26.15±1.91

TLWB- total litter weight at birth, 1TLMW- total litter weight at one-month age, TLWW - total litter weight at weaning: AA, BB - ($P < 0.001$)

In the Table 2. The average body weight at birth (TLWB), at one month of age (1TLMW) and at weaning (TLWW) of both sexes of lambs and birth type were presented.

The differences in TLWB, TLW1 and TLWW between male and female lambs were statistically significant ($P < 0.001$). Likewise, the differences in TLWB, 1TLMW between singles and twins were statistically significant ($P < 0.001$). On the other hand, there was difference in TLWW between birth type, but not statistically significant ($P > 0.05$).

This is in agreement with the results of the other researchers (Abdullah and Tabbaa, 2011.). Gamasae et al. (2010) stated that the effect of birth type was significant on birth weight of lambs and can be explained by limited uterine space and nutrition of lamb during pregnancy. The difference in weight between single and twin lambs increased from birth to weaning, which could be attributed to that singles were more capable of suckling their mothers than twins. The growth traits are important in productivity and are the major selected traits in sheep breeds. They are influenced by genetic and environmental factors as shown in numerous studies (Behzadietal., 2007, Dass et al., 2008.).

Conclusion

Homolje territory is an important natural resource of great potential, with specific characteristics of HNV (High Nature Value) region. Flora and fauna of Homolje region is particularly rich and abundant in many plant and animal species which, some of them being relict. Under agricultural land is 36 880 ha or 48% of the territory. Of that 42.9% of meadows, 26% of pastures and 31.1% is arable land. Meadows and pastures represented from the lowest level parts to the highest parts of the mountain ranges, which is a great potential for organic sheep production.

Considering the results Svrljig sheep is identified as a good potential for further development of organic sheep husbandry in East Serbia hilly mountain ecoregions. Svrljig sheep reared in a sustainable production system, and since it uses well natural pastures and meadows, its diet is based on existing plant resources. For achieving better productive results of Svrljig sheep, an integrated approach is necessary. The approach must contain all aspects of sheep keeping, feeding, breeding and disease prevention, as well as pasture management.

Acknowledgement

This study was supported the Ministry of Education and Science of Republic of Serbia, Grant No. TR 31085 and The Norwegian Programme in Higher Education, Research and Development in the Western Balkans HERD/Agriculture Project 09/1548, 332160 UA.

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Original scientific paper
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BOOK OF PROCEEDINGS

**Sixth International Scientific Agricultural Symposium
“Agrosym 2015”**

AGROSYM 2015



Jahorina, October 15 - 18, 2015

Impressum

Sixth International Scientific Agricultural Symposium „Agrosym 2015“

Book of Proceedings

Published by

University of East Sarajevo, Faculty of Agriculture, Republic of Srpska, Bosnia
University of Belgrade, Faculty of Agriculture, Serbia
Mediterranean Agronomic Institute of Bari (CIHEAM - IAMB) Italy
International Society of Environment and Rural Development, Japan
Balkan Environmental Association, B.EN.A, Greece
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Maize Research Institute „Zemun Polje“ Serbia
Balkan Scientific Association of Agricultural Economics, Serbia
Institute of Agricultural Economics, Serbia

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Website:

<http://www.agrosym.rs.ba>

CIP - Каталогизација у публикацији

Народна и универзитетска библиотека
Републике Српске, Бања Лука

631(082)(0.034.2)

INTERNATIONAL Scientific Agricultural Symposium "Agrosym
2015" (6 ; Jahorina)

Book of proceedings [Elektronski izvor] / Sixth International
Scientific Agricultural Symposium "Agrosym 2015", Jahorina,
October 15 - 18, 2015 ; [editor in chief Dušan Kovačević]. - East
Sarajevo =Istočno Sarajevo : Faculty of Agriculture =Poljoprivredni
fakultet, 2015. - 1 elektronski optički disk (CD-ROM) : tekst, slika ;
12 cm

CD ROM čitač. - Nasl. sa nasl. ekrana. - Bibliografija uz svaki rad. -
Registar.

ISBN 978-99976-632-2-1

COBISS.RS-ID 5461016