

## THE EFFECTS OF CROSSBREEDING ROMANOV EWES WITH WILTSHIRE HORN RAMS ON EWE FERTILITY AND PROGENY PERFORMANCE

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**Abstract.** According to the current demands of domestic and international markets, meat-producing sheep breeding is considered as having the best future. Therefore, sheep breeders are apt to choose more meaty and less woolly breeds. Earlier very popular Romanov sheep do not satisfy the today's requirements of either breeders or customers. Although the ewes of this breed produce litters of 3 to 5 lambs at a time, but these lambs show low growth intensity and the dressing percentage accounts for only 40% after slaughter. Moreover, the sheep require from 2 to 3 shearings per year. Thus, it was not without a purpose that Romanov sheep were improved using woolless mutton Wiltshire Horn rams after their import to Lithuania in 2005.

The aim of our study was to determine the influence of Wiltshire Horn rams on the fertility of Romanov sheep, their progeny weight, meat percentage and wool length. Twelve Romanov ewes and two rams of Romanov and Wiltshire Horn breeds and their progeny (18 purebred and 14 crossbred) were used in the study. All the animals were allotted into two groups of six ewes and one ram each.

In April 2009, the ewes were mated and lambed in October. Ewe fertility was evaluated by the number of lambs born per litter. The lambs were weighed at day 1 and 7 months of age. Wool quality of lambs was assessed at one and seven months of age by measuring wool length to within 0.5 cm on the side. Lamb muscularity was determined visually on a 1 to 9 point scale by touching the back, shoulder blades and thighs of lambs at 7 months of age.

The mating of fur bearing Romanov sheep with a woolless mutton Wiltshire Horn ram had a positive effect on the weight, growth rate and meat percentage of crossbred lambs. Although the number of crossbred lambs born was by 26.50% lower, but they were by 1.04-1.25 kg heavier ( $P<0.001$ ) and gained daily by 36.55-50.85 g more ( $P<0.001$ ), and thus exceeded the purebreds by weight from 8.74 to 11.69 kg ( $P<0.001$ ) and had 1.30-1.87 points higher muscularity than the purebred lambs. Crossbred lambs also inherited white wool colour of the Wiltshire Horn ram and low wool production. Until 7 months of age, the wool length of purebreds increased while the wool of crossbreds naturally moulted and did not require shearing.

**Keywords:** Romanov ewes, Wiltshire Horn, crossbreeding, fertility, growth rate, meat percentage, wool length.

## ROMANOVO VEISLĖS AVIŲ MIŠRINIMO SU WILTSHIRE HORN AVINAIŠ ĮTAKA ĖRIAVEDŽIŲ VISLUMUI IR PRIEAUGLIO PRODUKTYVUMUI

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**Santrauka.** Pagal dabartinės vidaus ir užsienio rinkos poreikius perspektyviausia yra mėsinė avininkystė, todėl avių augintojai renkasi mėsingesnes ir mažiau vilnos duodančias avių veisles. Anksčiau labai populiariomis laikytos Romanovo veislės avys šiandien netenkina nei augintojų, nei pirkėjų. Nors vienu metu jos atveda po 3–5 ėriukus, jie auga lėtai, o juos paskerdus lieka iki 40 proc. mėsos. Be to, šias avis reikia kirpti 2–3 kartus per metus (tai nuostolinga). Ne veltui Romanovo veislės avis pradėta gerinti bevilniais mėsiniais *Wiltshire Horn* aviniais, įvežtais į Lietuvą 2005 metais.

Mūsų tyrimų tikslas – nustatyti *Wiltshire Horn* avino įtaką Romanovo avių vislumui, prieauglio svoriui ir raumenin-gumui bei vilnos ilgiui. Šiems bandymams panaudota 12 Romanovo veislės ėriavedžių ir dviejų skirtingų veislių (Ro-manovo ir *Wiltshire Horn*) avinai bei iš jų gauti ėriukai (18 grynaveislių ir 14 mišrūnų). Bandomosios avys buvo su-skirstytos į dvi grupes (po 6 ėriavedes ir vieną aviną kiekvienoje).

2009 m. balandžio mėn. sukergtų ir spalio mėn. apsiėriavusių avių vislumą įvertinome pagal atsivestų ėriukų skai-čių, o ėriukus svėrėme 1 paros ir 7 mėn. amžiaus. Jauniklių vilningumą įvertinome 1 mėn. ir 7 mėn. amžiaus laikotar-piu, išmatavę vilnos ilgį 0,5 cm tikslumu ant ėriuko šono. 7 mėn. ėriukų raumeningumą nustatėme vizualiai (pagal 1–9 balų sistemą), apėiupinėdami jų nugarą, mentes ir kumpius.

Kailinių Romanovo veislės avių kergimas su bevilniu mėsiniu *Wiltshire Horn* avinu turėjo teigiamos įtakos atvestų ėriukų svoriui, augimo intensyvumui ir raumeningumui. Nors mišrūnų ėriukų atvesta 26,50 proc. mažiau, jie buvo 1,04–1,25 kg sunkesni ( $p<0,001$ ) ir kasdien priaugo 36,55–50,85 g svorio daugiau ( $p<0,001$ ). Būdami 7 mėn. jie svėrė 8,74–11,69 kg daugiau ( $p<0,001$ ) ir buvo 1,30–1,87 balo raumeningesni negu grynaveisliai. Mišrūnai ėriukai ne tik paveldėjo baltą *Wiltshire Horn* avino vilnos spalvą, bet ir mažą vilningumą. Ėriukams augant (iki 7 mėn.), grynaveislių vilna ilgė-jo, o mišrūnų – natūraliai išsišėrė, todėl nereikėjo nė kirpti.

**Raktažodžiai:** Romanovo avys, *Wiltshire Horn*, mišrinimas, vislumas, augimo intensyvumas, raumeningumas, vil-nos ilgis.

**Introduction.** Sheep population in Lithuania amounts to 55,000 animals of various breeds. The majority of sheep (about one-third) belong to the Lithuanian Blackface breed and one-fourth of all the sheep to the Romanov breed. Other breeds number only several thousand or are even counted in only hundreds or tens (Zapasnikienė<sup>1</sup>, 2003).

The first Romanov sheep were brought to Lithuania in 1988. At present there are over 12,000 sheep including one thousand breeding ones. Farmer P. Gaidamavičius (Kaišiadorys district) was among the first who started breeding Romanov sheep and currently his farm (over 200 animals) is acknowledged as A category breeding farm that has provided many other farmers with Romanov sheep (Zapasnikienė<sup>2</sup>, 2003).

However, previously very popular due to high fertility and rapid flock increase, nowadays Romanov sheep do not meet the sheep breeders' requirements because 3 to 5 newborn lambs require additional care and the slaughter of youngsters or adult sheep results in only less than 40% of meat. Moreover, thrice a year shearing is required for the sheep of this breed, and this means additional expenditure and labour costs for the farmer. In addition, there are no qualified shearers to be hired in Lithuania and no demand for the wool itself.

Therefore, wool productive and lightweight local sheep of various breeds are crossbred with shortwooled and meaty rams not only in Lithuania but other countries as well. Creobreeding with Suffolk, Texel, Charollais and other mutton breeds is considered to be quite effective (Brzostowski et al., 2006; Ellis et al., 1997; Fadili, Leroy, 2006; Galiwan et al., 1993; Gama et al., 1991; Maria et al., 1993; Milerski, 2006; Young, Dickerson, 1991; Zapasnikienė, 2001).

Sheep breeding currently tends towards production of less wool and more meat. Therefore, the main aim of sheep breeders is to look for suitable breeds and their combinations to produce quality mutton. Of late, there is greater interest in specialized shortwooled and especially woolless mutton sheep breeds (Dorper, Wiltshire Horn, etc.) and their usage possibilities. In 2003 eight Dorper sheep from Germany and in 2005 thirty-four Wiltshire Horn sheep from the Netherlands were imported to Lithuania.

The Dorper sheep breed was developed in 1930 by crossbreeding Dorset Horn and Persian Blackface sheep.

This is the second by number mutton woolless sheep breed that has gained popularity all over the world (Adams, 2007; Burgfening, Kress, 1993; Jong, Bijma, 2002).

Wiltshire Horn sheep originated in the Mediterranean region and were officially recognized as the ancient English sheep breed even 250 years ago. The breed was numerous in 17th-18th centuries, and at the beginning of the 20th century it became on the verge of extinction. In 1950-1970 Wiltshire Horn sheep were exported to Australia, where they were used for the development of Wiltipoll sheep breed. Comparatively high numbers of sheep were exported to the USA, Canada and other countries (Susan Flickr, 2011; Wonoka, 2011).

Both Dorper and Wiltshire Horn rams are widely used in the crossbreeding with the sheep of various breeds (Suffolk, Texel, Dorset, etc.) worldwide. Crossbreeding of finewooled Marino sheep with woolless rams is especially popular in Australia because progeny with short wool is highly desirable for protection of the animals against various pests (flies, lice, etc.) and for the pasturing convenience purposes (Rathie et al., 1994; Scobie et al., 2005; Shirley, 2007; Young, 2007).

Individual sheep genotypes are being developed in different regions of the world to meet the market demands and be adaptable to the specific climatic and housing conditions (Lawrence et al., 2004; Maniatis, Pollott, 2002; Rydhmer, 2005).

In Lithuania, sheep breeders, especially those keeping Romanov sheep, currently are also interested in the use of woolless mutton Wiltshire Horn rams in their flocks. In 2008, one Wiltshire Horn ram was purchased by the farmer P. Gaidamavičius (Kaišiadorys district).

The purpose of this study was to determine the influence of Wiltshire Horn ram on the fertility, progeny weight, meatiness and wool length of Romanov sheep.

**Materials and methods.** The study was conducted in the Romanov sheep breeding centre owned by farmer P. Gaidamavičius in 2009-2010. Twelve Romanov ewes, one Romanov ram and one Wiltshire Horn ram were used in the study. All the animals were selected after evaluation of all 185 ewes and 6 rams kept in the centre. The animals were allotted into two groups of six ewes and one ram each with respect to the age, weight and the amount of sheared wool (Table 1).

Table 1. **Group characteristics**

Item	Control group	Experimental group
	Romanov x Romanov	Romanov x Wiltshire Horn
No of ewes	6	6
No of rams	1	1
Age of ewes, year	4.50	4.50
Age of rams, year	3.00	1.50
Ewe weight, kg	64.05	64.33
Ram weight, kg	82.90	84.00
Wool weight of ewes, kg	2.65	2.70
Wool weight of rams, kg	2.82	-

The study was performed in pursuance with the Lithuanian animal care, management and operation legislation (No 8-500, 28 November 1997) and also was in compliance with the EU Directive 86/60\*9/EEC and EC recommendation 2007/526.

The ewes were mated in April and lambed in October 2009. Their fertility was evaluated by the litter size. The lambs were weighed at 24 hours after birth and seven months of age. Wool growth in youngsters was evaluated at one and seven months of age by measuring wool length to within 0.5 cm on the side at a hand-breadth from the shoulder-blade. The meatiness of purebred and crossbred lambs was determined visually at seven months of age on

a 1-9 point scale by groping their back, shoulder blades and thighs (Sheep evaluation rules, 2006).

The data were processed biometrically using Microsoft Office Excel 2007 version 1.2. Data significance was determined by Student's test. The data are significant at  $P < 0.05$  (Čekanavičius, Murauskas, 2002).

**Results and discussion.** Due to the fact that Romanov sheep can come into heat and lamb at any time of the year, the experimental ewes were mated in April and lambed in October. This period was chosen purposefully to have mating and lambing in the barn where it is easier to make up the groups and look after the progeny. Ewe reproduction data are presented in Table 2.

Table 2. Ewe reproduction data

Item	Control group	Experimental group
	Romanov x Romanov	Romanov x Wiltshire Horn
Ewe fertility	3.17 ± 0.477	2.33 ± 0.494
No of live female lambs born	8	7
No of live male lambs born	10	7

The data in Table 2 indicate that the lambing results of Romanov ewes mated with Romanov ram were by 26.5% higher than those with Wiltshire Horn ram. All in all 19 purebred (including one stillborn) and 14 crossbred lambs

were born. Moreover, mating Romanov sheep with Wiltshire Horn ram did not result in any lambing complications. Wool colour and length data are presented in Table 3.

Table 3. Wool characteristics of lambs

Item	Control group	Experimental group
	Romanov x Romanov	Romanov x Wiltshire Horn
Wool colour of a newborn lamb	black	white
Wool length of a month old lamb, cm:		
female	1.40 ± 0.100	5.36 ± 0.261**
male	1.50 ± 0.134	5.50 ± 0.154**
Wool length of a 7 month-old lamb, cm:		
female	6.75 ± 0.214**	2.80 ± 0.122
male	7.58 ± 0.352**	2.90 ± 0.245
Wool colour of 7 month-old lamb	grey	white

\*\*P < 0.001.

Table 4. Growth data of lambs

Item	Control group	Experimental group
	Romanov x Romanov	Romanov x Wiltshire Horn
Weight of newborn lambs, kg:		
female	2.16 ± 0.148	3.20 ± 0.118**
male	2.34 ± 0.182	3.59 ± 0.141**
Weight at 7 months of age, kg:		
female	27.28 ± 0.256	36.02 ± 0.568**
male	32.61 ± 0.506	44.30 ± 0.854**
Daily gain in 0-210 days, g:		
female	119.69 ± 1.178	156.24 ± 1.913**
male	142.50 ± 2.096	193.35 ± 3.423**
Muscularity at 7 months of age, points:		
female	5.33 ± 0.211	7.20 ± 0.200**
male	6.50 ± 0.224	7.80 ± 0.374*

\*P < 0.025; \*\* P < 0.001.

As it can be seen from Table 3, crossbred lambs have inherited white wool from Wiltshire Horn ram, though Romanov lambs are usually born black. Moreover, the wool of one month old crossbred lambs was 3.96-4.00 cm longer ( $P<0.001$ ) than that of purebred Romanov lambs. It was observed that while growing up to 7 months of age the wool of crossbred lambs was naturally moulting and the wool length of purebred lambs increasing. Thus, at 7 months of age purebred Romanov lambs had to be sheared because their wool was 6 to 8 cm long and the wool of crossbreds had moulted to 2 to 3 cm in length. The effect of crossbreeding on the lamb growth and development is shown in Table 4.

The data in Table 4 indicate that newborn crossbred lambs were 1.04-1.25 kg heavier ( $P<0.001$ ) than purebred Romanov ones. Moreover, crossbred lambs inherited higher growth rate and muscularity. All the lambs were weighed after 24 hours and at 7 months of age to count their daily gain in grams which is the best indicator of the growth intensity of animals. In the period from 0 to 210 days crossbred females and males gained daily, respectively, 36.55 and 50.85 g more ( $P<0.001$ ) than purebred Romanov lambs. Therefore, at the age of 7 months, crossbred lambs exceeded Romanov lambs in weight by 8.74-11.69 kg ( $P<0.001$ ) and were of higher muscularity by 1.30 to 1.87 points ( $P<0.025$ ;  $P<0.001$ ).

Unfortunately, analogous studies have not been found in the literature survey because Romanov sheep are mostly used for fertility improvement of other breeds (e.g. in 1980 they were brought to Canada and in 1986 to the USA), whereas Suffolk rams in the USA and Texel ones in Europe are used for meatiness increase.

### Conclusions

1. Mating fur bearing Romanov sheep with woolless mutton type Wiltshire Horn ram had a positive influence on lower fertility of ewes and higher weight of newborn lambs, their growth intensity and muscularity.

2. Newborn crossbred female lambs were 1.04 kg heavier ( $P<0.001$ ) and gained daily 36.55 g more ( $P<0.001$ ), thus, at the age of 7 months they exceeded their purebred contemporaries in weight by 8.74 kg ( $P<0.001$ ) and in muscularity by 1.87 points ( $P<0.001$ ). Newborn crossbred male lambs were 1.25 kg heavier ( $P<0.001$ ) and gained daily 50.85 g more ( $P<0.001$ ), therefore, at the age of 7 months their weight and muscularity were, respectively, by 11.69 kg ( $P<0.001$ ) and 1.30 points higher ( $P<0.001$ ) than those of purebred Romanov lambs.

3. Crossbred lambs inherited white wool colour from Wiltshire Horn ram and low wool production as wool naturally moulted from 5-6.5 cm at one month of age to 2-3 cm at 7 months of age and did not require shearing ( $P<0.001$ ).

4. It is advisable to mate fertile and low weight Romanov ewes with mutton type woolless Wiltshire Horn rams in order to increase progeny meatiness and lower wool production when wool shearing three times a year is replaced by single shearing.

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