



EAAP Animal Fibres Working Group

&

Department of Sheep and Goat Breeding,
Warsaw University of Life Sciences



WORKSHOP on

**“Use of animal natural fibres for the stimulation
of the local small factories and local markets”**

Book of abstracts

26-27 May 2010
Warsaw, Poland

Programme



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**“Use of animal natural fibres for the stimulation of the
local small factories and local markets”**

PROGRAMME

26.05.2010 (Wednesday).
11:00-12:00 Registration of participants.

12:00 Inauguration of workshop.
NIŻNIKOWSKI Roman
Warsaw University of Life Sciences

RENIERI Carlo
President of the EAAP Animal Fibres Working Group

12:10 Session I. “Biology of fleece”
Chairman: RENIERI Carlo

“Biology of fleece: Characterisation of fleece of sheep (Merino), Angora and Cashmere goats, alpacas and llamas, Angora rabbits and other species”

GALBRAITH Hugh
(School of Biological Sciences – University of Aberdeen – UK)

13:30 Discussion.
14:00-15:00 Lunch break.

15:00 Session II. “European experiences concerning the usage of sheep wool on the example of Merino breed”:
Chairman: GERKEN Martina

“Arianne: an International Textile Consortium”

ANTONINI Marco

(ENEA/University of Camerino – Italy)

“The experience of the Consortium Biella the Wool Company”

THOMPSON Nigel

(President of Biella The Wool Company – UK/Italy)

“Sheep wool production and processing in Austria”

RINGDORFER Ferdinand

(Department of Sheep and Goat Breeding – Research and Education Centre Raumberg-Gumpenstein

Institute of Livestock Research – Austria)

16:30 Discussion.

17:00 Ending conclusions.

19:30 Evening event.

27.05.2010 (Thursday).

8:00 Breakfast

9:00 Session III. “European experiences concerning the usage of wool of other animal species”:

Chairman: ALLAIN Daniel

“European experiences concerning the usage of wool of other animal species: alpacas and llamas”

GERKEN Martina

(University of Gottingen – Germany)

“French experience concerning fibre production from Angora goats and Angora rabbits”

ALLAIN Daniel

(INRA – France)

“Cashmere goats: sustainable use of marginal farmland while producing high value added product”

KRAVIS Nora

(President of the Italian CAPCASHIT Association – USA/Italy)

“Fibre characteristics of Huacaya alpaca breed at their first shearing”

MORALES VILLAVICENCIO Anna, NIŻNIKOWSKI Roman, PIETRZYKOWSKI Piotr –

(Department of Sheep and Goat Breeding – Warsaw University of Life Sciences – Poland)

10:30 Discussion.

11:00 Coffee break.

11:30 Session IV. “Present situation in the natural fibre production from animals in the Central and Eastern European countries”:

Chairman: NIZNIKOWSKI Roman

“Changes of fibre diameter in some sheep breeds in Poland after many years of abandonment of breeding work carried out towards the improvement of the quality characteristics of wool”

NIŻNIKOWSKI Roman, STRZELEC Ewa, GŁOWACZ Krzysztof, CZUB Grzegorz (Department of Sheep and Goat Breeding – Warsaw University of Life Sciences – Poland)

“Data regarding the production of wool and fibers in Romania”

ZAMFIRESCU Stella

(University Ovidius Constanca – Romania)

“Current situation of animal fibers production and processing in the Czech Republic”

MILERSKI Michał

(VUŽV Uhrineves – The Czech Republic)

“Present situation in the animal natural fibre production in Slovakia”

MARGETIN Milan¹, DUBRAVSKA Jarmila², BORECKÁ S.³

(¹ - Slovak Agriculture University – Nitra, ² - Ministry of Agriculture of Slovak Republic and ³ - Research Institute for Agriculture and Food Economics – Bratislava – The Slovak Republic)

“Present situation in the wool production in Hungary”

CEHLA Béla¹, JÁVOR András¹, KUKOVICS Sándor², GERGELY Éva¹, NÁBRÁDI András¹

(¹ - Faculty of Applied Economics and Rural Development – Centre for Agricultural Sciences and Engineering – University of Debrecen – Hungary and ² – Research Institute for Animal Breeding and Nutrition – Herceghalom - Hungary)

“Present situation in the wool production in Poland”

STRZELEC Ewa, NIŻNIKOWSKI Roman, GŁOWACZ Krzysztof, CZUB Grzegorz

(Department of Sheep and Goat Breeding – Warsaw University of Life Sciences – Poland)

13:00 Discussion

Perspectives of the textile industry development - collecting of raw materials and their processing.

13:30-14:30 Lunch break.

14:30 Panel. Proposal for the EU Project for the Central and Eastern European Countries in case of the management of the natural fibre from different animal species.

Chairman: NIZNIKOWSKI Roman

16:30 Ending conclusions and closing of the workshop.

Abstracts

Biology of fleece: Characterisation of fleece of sheep (Merino), Angora and Cashmere goats, alpacas and llamas, Angora rabbits and other species.

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Summary. The hair coat (“fleece”) containing natural fibres is an economically important product of a range of domesticated animal species. Fibres are synthesised, uniquely in mammals, in hair follicles embedded in skin. The follicles occur in two main anatomical structures; in “primary” or “secondary” forms and in a range of subtypes. Animals with high ratios of secondary to primary follicles are generally favoured in breeding programmes. Typical values for fineness (diameter) and annual raw fibre yield for the major fibre-producing animal species are as follows. Merino sheep (predominantly “single-coated” genotypes), 17-22 μ m, 6kg -15kg: Cashmere (“double-coated” goats), 12-18 μ m, 0.06 -1.0kg: mohair (predominantly “single-coated” Angora goats), 22-35 μ m, 2.0-5.0kg: Alpaca (predominantly “single-coated”), 18-30 μ m, 1.5-5.5kg: Llama (predominantly “single” and “double-coated” genotypes), 20-30 μ m: 1.5-5.0kg). The mainly undomesticated Vicuña (8-15 μ m: 0.5-1.5kg) and Guanaco (15-18 μ m: 0.5-1.5kg) are “double-coated”. Angora rabbits typically produce up to 1.5kg at 10-13 μ m. The most commercially important “finest” fibres are principally those derived from secondary hair follicles.

In considering the biology of fleece production it is useful to consider both hair follicles and fibres in fleece. Important characteristics for fibres include numbers and length, diameter (“fineness”), medullation, crimp, cuticle structure, lustre, pigmentation and tensile strength. These characteristics, in turn, are regulated by number, structure and cell and molecular activities of hair follicles in which the fibres are produced.

Follicles develop in the embryo from interactions of mesodermal (forms the dermal papilla (DP)) and overlying ectodermal (fibre-forming) tissue. Post-natal fibre and its major components of medulla, cortex and cuticle develop from keratinocytes according to position in the follicular bulb matrix. The synthesis of pigmentation in fibre depends on the presence of melanocytes in the bulb matrix. The anatomical structure and activity of post-natal follicles vary according to species and location on the body. All follicles exhibit cycles of active fibre growth (anagen) followed by follicle regression and no growth (telogen). Regeneration produces a new bulb matrix with existing DP and frequently shedding (“moult”) of the previously produced fibre. The duration of anagen is important in determining yield and varies, for example, from two years or greater for fleece of Merino sheep to 6 months or less for cashmere in goats.

Hair fibre is composed principally of cells containing keratins, keratin-associated proteins and adhesion molecules expressed from a range of increasingly recognised genes. These cells and constituent molecules contribute to the desirable physical properties of processed wool-based products.

Physiological, cellular and molecular control mechanisms are important in regulating follicle development, cycling, response to photoperiod and physiological state (eg. age, sex, pregnancy and lactation). These involve chemical signalling and typically include endocrine-, paracrine- and autocrine-acting molecules and interactions with their receptors located on cell membranes or intracellularly. Chemical signalling may be mediated at transcription (eg transcription factors and co-factors), translation (eg microRNAs) at gene level, and post-translationally (eg modification of proteins). Important hormones, growth factors and inhibitors and receptors have been identified. These mediate mechanisms associated with presence or absence of follicles in skin, development of patterning for primary or secondary follicles, presence of melanocytes, synthesis of identifiable fibre structures and expression of structural and catalytic proteins and signalling proteins. These mechanisms provide focus as targets for explanation of the genetic basis of phenotypic variation in follicles and fleece products including those which produce differences between and within species. They have scope to contribute to genetic selection. Examples which will be considered include variations in wool production by Merino sheep and between Suri and Huacaya breeds in Alpaca and mohair and cashmere by goats.

Key words: Wool fleece; fibre composition; hair follicle; follicle cycle; follicle growth regulation; genetic variation

Arianne: an International Textile Consortium

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Abstract. ARIANNE is an INTERNATIONAL CONSORTIUM FOR THE NATURAL TEXTILE FIBRE STUDY and development. Arianne was established in 2002 at the University of Camerino. The initiative found immediate support from the ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development. involving partners such as agencies, national and international associations of farms and textile manufacturing companies. Arianne is currently composed by 34 Members including 2 Public Bodies, 7 Association, 11 farms and 11 textile firms. The members are distributed in 7 different Italian Regions and 3 of them are outside the European Community.

The main goal of Arianne is promoting the natural fibres as a means of territory development and international cooperation. Specific objective of the consortium are : organizing a “bridge gap” between producer and market; reinvest the added value generated in the agricultural enterprises; the textile “processing chain” as a approach to support the territorial development

The strategy to achieved at the proposed goal is: the recovery of the territory and landscape; the promotion of Corporate Social Responsibility (CSR) by reducing the processing chain; the definition of goods representatives of the territory.

In Arianne the means of Corporate Social Responsibility can be summarized with the following slogan: *Think global / Act local*, as meaning that: a sustainable management of natural resources (pasture, water and energy); transparency in every phase of the textile/clothing production chain; definition of the Production Guide line as a first tool to promote the territory.

Arianne promoted several projects of research and development on natural fibre and natural colour at National and international level.

Taking into account that: the natural fibre textile market is decreasing especially for fine fibres, natural fibre are always less competitive, except for fine fibre, the fine fibre market beside high quality, requires also “customisation of products”; consumers of natural products would like to know the “History” behind what they buy;

Arianne are promoting activities and project addressed to: improve production of raw materials in order to offer homogeneity and quality; define guideline addressed to define common strategy in fibre collection and common selection objectives and criteria to be shared among the producer countries with the support of ICAR (International Committee of Animal Recording); Bridge the gap between production and market; Characterise the finished product, in other terms “DEGLOBALISE” production of natural textiles. Arianne want to promote research into improving the relation between the product and its production territory (*Environment, Culture and Economy*) starting with territory specific historical economic studies. In this perspectives Arianne encourage the use of the Knowledge of the territory and local culture as a tool to create and promote products and the reinforcement of the collaborations and “Complicity” among the principal actors in the distribution chain, in particular with agricultural entrepreneurs

Key words: Natural Fibre, textile, consortium

The experience of the Consortium Biella the Wool Company

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Abstract. The European wool industry has been in decline for many years but the niche market for the very best quality cloth still remains, and that will not disappear quite as quickly. Also there are some small wool artisanal companies, mainly in Europe and North America that purchase small quantities of good quality wool, mainly from special breeds, from the farmer and process it into a final product that is then sold onto the final customer. Their expertise is second to none, they create their own distribution network that keeps away from the large distributors and many are successful. They are passionate about what they do, and are very knowledgeable about their product. However due to the very nature of their business they may be very successful but limited in future growth, as they must maintain distance between themselves and the full blown wool textile industry, otherwise they press the self destruction button.

However even in this case the farmer still gets his 60cents per kilo or perhaps even 50cents more, but this is still not enough to stimulate the farmer to invest in improving wool quality.

Consorzio Biella the wool company

This is a consortium made up of small wool processors, wool technicians, and designers in the Biella wool textile District, located on the edge of the Italian Alps that is known worldwide for the quality of its wool processing, from greasy wool to final garment. The wool manufacturing sector is by far the biggest employer in Biella with almost 1000 companies involved. Biella is a beautiful town, with the magnificent backdrop of the Italian alps rising immediately to over 2500m. and has never had “dark sanatic mills” more closely associated with the north European textile industry. It’s position, over an hour from the industrial cities of Milan and Turin, has enabled it to develop almost in isolation, without too many distractions from the rest of Italy, but has created a pressure cooker of ideas, of wool creativity, of design, unlikely to be equaled anywhere in the world.

The overall aim of the consortium is to conserve the quality wool traditions in Biella by converging many small quantities of quality European and non European wools to the Biella area hence its core objective is to offer the farmer a wool processing system from greasy to finished garment, using local artisans.

The amount of wool expertise available in Biella permits us to study further projects including the collection and classification of central European wools and the promotion of wool as a fibre throughout the European school education system.

This will permit him to deliver his wool to us and we will transform into whatever products he requires and return the goods to him with full traceability, a guarantee that the goods have been wholly processed in a top quality European wool manufacturing centre using water from the melted snow of the Italian Alps with total respect for the local environment and it’s workers.

This service is aimed at the sheep breeder who already has a point of sale, be it a farm shop, or in a tourist area or other. For the sheep breeder without this opportunity we would like to encourage local wool associations to become involved and distribute the goods at local agricultural fairs or national parks. It is important that we do not convert a “greasy Wool problem” into a “finished product problem”. The quantities involved initially are small – we suggest lots of 3/400kilos no more – to be processed into different articles not all the same - and the number of sheep breeders who have the mentality and economic means will not be many but should they be successful they will be the catalyst for others to try, leading indirectly to improving the quality of the wool in Europe.

Key words: wool

Sheep wool production and processing in Austria

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Abstract. Austria is a small country with 9 federal countries. Each of them has a sheep breeding association. Total number of sheep in 2009 was about 405.000. This sheep were kept in approximately 15.600 farms. The mathematical flock size is 26 sheep per farm. All over the country 26 different sheep breeds are kept. Sheep are kept in the low land part of Austria as well as in the alpine part. We have small farms, different production conditions and a lot of breeds with different quality of wool. Quality differs in fineness of fibre and also in colour of fibre. These are not the best conditions for a wool market.

The main aim of sheep production in Austria is meat and milk production and also landscape cultivation. Wool production has no importance.

Wool production. In 2009 total greasy wool production in Austria was 660.000 kg. This was the wool from 220.000 sheep. That means, that the annual amount of wool per sheep is 3 kg. Most of the sheep are shorn twice a year, in autumn and spring. By the sheep breeding organisations approximately 287.000 kg wool are collected and sold. More than half of the annual wool production is sold or processed or removed in any way by the farmer themselves.

Wool processing and market. The marketing of wool is very different. Most of the wool is collected by the sheep breeding associations. One time or twice a year the associations organize local wool collection. The wool must be clean and is classified and separated by colour. The wool is pressed by a special wool press or by a press used for pressing hay or silage. This wool is used for producing isolation material.

Another part of wool marketing, the smaller one, is in local organisations. This is done mostly by women. In small groups they wash the wool, colour it with different nature colours and spin or frisk it. They make different products like clothes, huts, bags, slippers, blankets, carpets and decorations.

Wool is also used in the forest. To protect young trees from wild life animals the people wrap a small clump of wool around the bud on the top of the tree. But not only in the forest also in vineyards wool is used to protect the vine.

Costs and wool price. Wool production has no economical importance in Austria. Sheep must be shorn. This work is mostly done by professional sheep shearers. The cost for this work depends on the flock size and also on the distance to the farm. The average price for one sheep is between 3.5 and 4 EURO. The price for one kg greasy wool is approximately 0.3 to 0.6 EURO, depending on the quality and the colour and also on the purchaser.

European experiences concerning the usage of wool of other animal species: alpacas and llamas

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Summary. Alpacas (*L. pacos*) and llamas (*Lama glama*) belong to the camelid family from the suborder Tylopoda which is divided into the Old World Camelids and the New World Camelids (South American Camelids, SAC). The latter include the domesticated alpaca and llama and the wild guanaco (*Lama guanicoe*) and vicuña (*Vicugna vicugna*). The domestication of alpaca and llama occurred 5-6,000 years ago in South America. In wild lamoid guanaco and vicuña genotypes, the hair coat is formed by two types of hair, the coarse outer guard hairs and a finer undercoat which is typical of the “double coat” found in other undomesticated mammalian species. In contrast, there are variations in coat morphology in the domesticated llamas and alpaca which exhibit variably double coat and predominantly single coat, respectively. During the domestication process, alpacas with finer fibre and more uniformity than modern day alpacas were developed. During the Inca rule of the 1400s organised breeding programs existed to provide the raw material for the production of exquisite cloths made from alpaca, llama and vicuña fibre. After the Spanish conquest, lamoid numbers dramatically declined and llamas and alpacas were left to interbreed. Lamoids were then sporadically exported to other countries from South America, but the majority of animals died during the transport. It was not until the mid 1800s that the beauty of lamoid fleece was “rediscovered” when an English wool merchant imported alpaca fibre into England in 1836, probably to replace mohair fibre. The increased world’s interest caused large exports of fibres and live alpacas from South America. To safeguard their industry, Peru, Bolivia, Ecuador and Argentina placed a ban on live exportation of alpacas in 1843. Chile, however, did not join this ban until 1930. There was no legal exportation until the 1980s when the ban was lifted from alpacas and llamas. Importations were most easily from Chile which is periodically recognized as free of foot-and-mouth disease. In the 19th century, alpacas and llamas had been imported to Europe mainly as zoo animals. With the new export legislation, lamoids became more popular in Europe also as farm animals and several breeding associations were founded in the 1980s and 1990s, e.g. in the UK, France, Germany, Switzerland, Austria, and Italy. Llamas and alpacas have shown themselves to be able to adapt to very different climatic conditions all over the world. Over 90% of the world’s lamoid population is still living in South America with about 3.8 million llamas and 3.5 million alpacas. The largest lamoid populations outside of South America are found in Australia (about 100,000 alpacas) and USA (about 140,000 llamas and 60,000 alpacas). The number of lamoids in Europe are estimated with 30,000 llamas and 12,000 alpacas and they are kept for fibre production, tourism (trekking), breeding or pet animals. In contrast to e.g., Australia, there exists no uniform European breeding programme for fibre quality, although there are national efforts to register breeding animals. Some European associations offer collection, processing and marketing of fibre for regional markets. The fibre quality, however, lacks uniformity and the main income seems to be from selling of breeding stock, pet animals and tourism.

French experience concerning fibre production from Angora goats and Angora rabbits

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Abstract. French experience of mohair and angora wool production by angora goat and angora rabbit respectively will be described.

Angora goat breeding began in France on 1980. Today, about 7500 animals from 120 different farms, produce annually 20 tons of mohair. The entire French production is collected, graded and processed under the control of farmer's cooperatives, then marketed directly to consumers by farmers in the form of finished products, under a common trademark "Le Mohair des Fermes de France". A national selection scheme was developed with breeders in order to improve both quality and quantity of mohair produced by Angora goats. This selection scheme is based on a performance recording system, a national genetic database with breeding evaluation of animals on a national basis.

There was a longer experience in fibre production from angora rabbit. It was initiated during the 18th century and resulted in the development of a specific breed. The French Angora rabbit has a specific kind of fleece with well-differentiated guard hair and produces long and bristly wool. Such bristly fleeces are valuable because of their aptitude to produce a fluffy yarn used for certain luxury knit products. World Angora production largely dominated by China is approximately 8,000 tons. French production which was about 200 tons / year in 1990, decreased dramatically to about 1 ton / year today. To survive French farmers have developed a small niche market based on a direct marketing of final products to consumers. Many aspects of the genetic basis of fibre production by angora goat and angora rabbit are analogous. There are many traits controlling both fibre quality and fibre quantity, and most of these traits tend to be moderately to strongly inherited so that a rapid genetic progress in any traits is possible and indeed has been achieved. However, there are differences in breeding programmes. In Angora rabbit, selection for one single trait, the easy measurable total fleece weight has general beneficial effects on fleece quality. On the contrary in the angora goat because of antagonistic relations between qualitative and quantitative traits, achieving this goal requires a multi-trait selection index approach.

Fibre characteristics of Huacaya alpaca breed at their first shearing

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Abstract. Alpacas are known all over the world as a producers of thin fiber. Except the South America they are mainly bred in Australia, Canada, New Zeland, USA and also in Europe, including Poland. The fiber obtained from annual alpacas belongs the thinnest category, which is called 'bebe alpaca' and in accordance with Peruvian standard the fibre diameter should not exceed 22 microns.

The aim of presented paper is to explain in purpose for further selection, whether imported alpacas from Chile give offspring of a thin fiber. The fiber samples were collected from veil of 1-year old alpacas (n=30) in 2007 to measure their average diameters. The fibre length was investigated on fleece of live animals. Collected samples were divided into 3 groups due to the intensity of colour, each group included 10 samples. The fibre samples of both sexes were equally represented: 15 females and 15 males. The group of bright fibers included white, cream and beige, middle dark fibers included all shades of brown and in the darkest dark, gray and black.

Based on the results of the fibre length, the average length was 11.92 cm and statistically was much more longer in males (12.36 cm) than in females (11.46 cm). In case of color the diameter of all measured fibers (n=30) was on average 22.38 microns. Bright and middle dark fibers, which thickness was 20.98 and 20.94 microns, respectively, appeared to be high significantly ($p < 0.01$) thinner comparing to 25.23 microns in the dark fiber. In case of sex, females had thinner fiber (21.93) than males (22.84) but the differences were not statistically approved. Among investigated alpacas 43% fell into the category of 'bebe alpaca', remaining the abovementioned requirements of thickness.

Key words: alpaca, wool, fibre, diameter length

**Cashmere goats: sustainable use of marginal farmland
while producing high value added product**

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Abstract. The use of cashmere goats to reclaim and maintain marginal farm land while producing sustainable cashmere is the goal of our project “BRUCARE NON BRUCIARE”

The author describes the use of controlled grazing by Cashmere goats to reclaim, improve and maintain marginal and abandoned farmland, forests and public land, specifically in the Tuscan Region of Italy, while proposing the replication of the project within the European Common Market.

The economic and environmental sustainability of this type of livestock grazing permits the production of top-quality, organic MEAT, HIDES and CASHMERE.

The author illustrates the excellent fiber quality achieved by systematic genetic selection and the possibilities of establishing new herds in the new member countries of the EEC

Key words: sustainable cashmere, controlled livestock grazing, fiber quality, Cashmere goats

**Changes of fibre diameter in some sheep breeds in Poland
after many years of abandonment of breeding work carried out towards
the improvement of the quality characteristics of wool**

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Abstract. Due to the fact that one of the most important factors affecting the wool production of high quality is the wool fibre diameter, the wool standards of thickness were described for the leading wool producers among the Polish sheep breeds (Soroczyńska et al. 1992). The wool samples (size of 10 x 10 cm) were cut from the flank of an animal at the height of the half of last rib as the most representing for the whole fleece. Then, the distribution of fibre diameter as well as the average fibre diameter were evaluated basing on measurements of 600 fibres per sample. Basing on the obtained results, the wool standards for sheep breed in Poland was described. Since 1990 the breeding work and selection did not emphasized the wool thickness and other wool traits, therefore the similar experiment was repeated at the beginning of XXI century to recognize possible changes. The Polish Merino did not expressed significant changes both in the average fibre diameter and the fibre diameter distribution. Among the Polish Lowland Sheep (Żelazna and Polish Corriedale) the variability of the distribution of fibre diameter was similar to that from 1992, whereas the average fibre diameter appeared to be thinner. Similar tendencies due to the average fibre diameter were observed in the Polish Longwool Sheep (Kamieniecka and Pomorska), however the scale of fluctuation of the fibre diameters within staple was significantly wider presently than it was presented in the previous standard.

Generally summing up, the smallest changes were observed in Polish Merino sheep breed both in the average fibre diameter and the fibre diameter distribution. This observation indicates the maintaining of the breed potential to produce the wool of good processing quality by Polish Merino. The Polish Lowland and Longwool Sheep breeds expressed thinner average fibre diameter comparing to the standards, although the scale of variability of fibre diameter distribution became wider in fleece of the Polish Longwool Sheep breeds.

Key words: sheep, fibre, diameter

Data regarding the production of wool and fibers in Romania

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Abstract. In Romania, sheep breeding is a traditional activity which has been providing food and clothing for the population over the years. In December 1989, Romania had 16000000 sheep, which dropped to 5000000 in a few years. An ascending growth was recorded after 2000, when the number rose to 7.9 million and, at the beginning of this year, the total number is 10 million. The governmental strategies estimate a numeric growth in 2010 to 12 million, while in 2015 there will be over 15 million. The number of sheep is on the fourth place in Europe. At this time, the sheep breeding sector is completely privatized and, with a minimal financial aid from the government, the numeric growth is ascending.

In Romania, sheep breeding is favored by certain factors, among which, the most important is a large surface of pastures and grazing fields (33% of the country surface, located in mountainous, plateau and sub-hills zones), which is exploited only by sheep. The main breeds reared in Romania are Turcana and Tigaia, two local breeds which represent 76% of the total number and which have a genofund well adapted to the environmental conditions. The rest of 24% is represented by Merinos of Palas, Merinos of Transilvania, Karacul and other breeds with less numbers and importance.

According to the numeric dynamics of sheep, the wool production had the same evolution. The new socio-economical conditions in Romania led to the disappearance, in the past 20 years, of all the industrial factories for the processing of wool (cloth, carpets, beds etc). Thus, from a total production of over 30 million tons of wool (the quantity obtained in 1989), no wool is processed industrially today. Approximately 5000-6000 thousand tons are processed in private farms.

The imports and exports of wool in Romania are managed inconsistently so that the circulation and use of Romanian and imported wool are not known. The ITC statistical data, based on the COMTRADE statistics, offer information after the year 2000. An analysis of the imports realized in Romania between 2001 and 2005 shows that they increased, both in quantity and in value (from 7 tons imported in 2002 for \$2000/ton to 35 tons in 2005 for \$6714/ton). In 2005 Romania exported washed wool to the following countries: Turkey (346 tons, for \$1853/ton), Hungary (24 tons, for \$2125/ton), Republic of Moldova (22 tons, for \$1545/ton) and imported in 2005 washed wool only from Italy, namely 35 tons, for a unitary price of \$6714/ton. Romania is on the 30th place in the list of importers of washed wool at international level.

Goat fibers are non-usable, except an insignificant quantity exploited in the construction industry as insulating material. In Romania, only a small number of Angora goats are bred, whose fiber is used in research conditions by specialized institutions.

In conclusion, the industry of wool and fiber in Romania is underdeveloped and not used at its true potential, which requires the organization of wool fiber routes.

Current situation of animal fibers production and processing in the Czech Republic

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Abstract. In 1990 the number of sheep in the Czech Republic was 430 thousand; in 2000 it was only 84 thousands. Now the total is 183 thousands. Estimated production of wool in the grease is about 500-600 tons per year. Current farm prices of wool are very low, usually only from 3 to 5 Czech Crowns (0.12 - 0.2€) per kg greasy, whilst the prices used to be even 240 crowns for kg high quality merino wool in 1990. Taking the inflation into account the wool prices have decreased more than 200 times. Due to low prices farmers often disrespect wool management and classing, consequently quality of raw wool is rather poor in recent years. The main obstacle for processing of wool from domestic sources is the absence of facilities which would be agreeable to scour the domestic wool. Czech wool-processing factories are strictly specialized on oversea wool. According to custom statistics 41 thousand tones of greasy wool were imported to the CR (21 thousand tones were subsequently re-exported) in 2008. At the same time 36 tones of domestic wool were exported to Germany and about 10 tones of Romney wool to Great Britain. Less amount of domestic wool is scoured abroad (mainly in Poland) and then used by small Czech manufacturers of wool blankets and pillows or organic insulation materials. Some sheep wool is processed also by handmade spinning, felting, weaving and knitting. Part of wool production in the Czech Republic is considered and treated as organic garbage. Current numbers of mohair and cashmere goats and angora rabbits are negligible in the Czech Republic. Their fibers are handmade processed.

Present situation in the animal natural fibre production in Slovakia

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Abstract. Slovakia belongs to the countries with favourable conditions for agriculture. The total area of the agricultural land in use represented more than 1.9 million hectares. The greatest share of the area represented arable land and permanent meadows and pastures. Animal breeding is an important part of the Slovak's agriculture. The most important role plays milk and meat production. Typical animal became sheep.

Wool production played an important role in the past when subsidiary politics helped farms to increase their income and production. Nowadays production of the wool is only marginal part of the income. Wool production is not important for the farmer income but it is still protection of the animal.

Wool production in Slovakia consists of sheep wool, rabbit fibre and goat's wool. Sheep population is yearly slightly increasing. In 2009 more than 376 thousand head were bred in Slovakia and it is expected 390 thousand heads by the end of year 2010. Three main sheep breed are bred in Slovakia: Improved Valachian sheep, Tsigai and Merino. Primary production is milk and meat production (mostly lambs for the Easter). Quality of wool depends on different factors where weather is one of the most important. Total production of sheep wool was 580 tonnes (increase by 3 % compare to 2008) in 2009. Average wool production was approximately 1.6 kg/head/year in 2009. According to data obtained from the Statistical Office, Slovakia imported 140 tons (increase by 5.8% compare to 2008) wool worth 1.04 million € mainly from Serbia, New Zealand and Portugal. For the same period Slovakia exported wool worth 2.7 million € mainly to China, India and Pakistan. The price of wool dropped significantly in Slovakia in 2009. The most significant decrease was in March 2009 compared to February 2009 when the price dropped by € 0.14 per kg. During the year prices varies from 0.31 €/kg to 0.52 €/kg. The average wool price for 2009 was lower compare to price in previous year by € 0.18 per kg (approximately 31 %).

Total number of the goats is stabile. More than 40 thousand goats are bred in Slovakia. Most of the population produces milk for the human consumption. Only small share of the goat population produce fibres for the processing. Angora and Cashmere goats were imported from New Zealand and Denmark during 90-ies. Mohair and Cashmere wool production is small and official statistical data does not exist. Only data from the breeder association are available.

Angora rabbits were popular during 80-ies. The former Czechoslovakia produced more than 12 tons of Angora rabbit wool. Rabbits were bred mostly by small holders and wool was processed by small processing units. Currently, Angora rabbits are kept mostly for breeding purposes.

Key words: agriculture, wool production, fibre production, sheep, goat, rabbit.

Present situation in the wool production in Hungary

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Abstract. Wool production in Hungary has changed significantly during the last two decades, and these changes were analyzed in this present study. The production and trade of wool in the world were reviewed and were compared to the Hungarian processes. Not only natural data were evaluated but even explanations were searched for the fallback of the production.

Economic changes (e.g. privatization, etc.) since 1990's altered the ownership conditions, and the production firm sizes, and set back the significance of the wool quality. This last one was caused by ceasing the state subsidy of the wool (constituted 76,6% of the price till 1990) and liquidating the existing 11 wool processing firms till the second part of the 1990's. Only one of the several wool washing firms survived till today, which is in Italian ownership and handles small ratio of the Hungarian wool. The relevant ratio of the Hungarian wool is exported as baled raw wool, the inland processing is minimal and only of small industrial level.

As a result of the joint effect of the wool price decline happened parallel to the reduction of the number of sheep, the demand for quality decreased. Revenue from per ewe wool sale fell back and wool became a by-product constituting 1 to 3% of the gross income of wool. This contributed to the fact that the average fiber diameter increased by 1,5 to 3 micron during the last period and in Merino breeding stock only the minimal correspondence to the breed standards was the acceptable objective, as sheep farms became only-product producers (lamb).

The price of the wool in HUF did not change significantly from 1988 till nowadays. In order to reflect the real situation the value of wool was calculated to wheat equivalence. The results gained were surprising, as while at the end of the 1980's the price of one kilogram wool equaled with wheat of 20 kilograms, this value has decreased to 2,5 kilograms since the end of the 1990's.

The major portion of the production value of the sheep enterprise in Hungary comes from sheep farms producing for market, thus our aim was to analyze revenues of a breeding stock and a sheep farm producing for market in order to reveal the portion of the wool. The results strengthened the fact that the wool became a by-product in the enterprise. Under the present conditions of price and revenue ratio the producer does not have any interest in paying bigger attention to features of wool production (fineness, staple length, rendement) in the breeding process.

Present situation in the wool production in Poland

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Abstract. Polish sheep population presented wide-range fluctuations in the XX century. After the drastic fall of sheep population caused by the World War II, the significant increase of the sheep population was observed in period of 1946-1985. That increase of sheep population was caused by the increasing importance of wool in the total sheep production income (approx. 60%). The turn of 1989/1990 brought the marginalization of wool in the total income from the sheep production and farmers put the emphasis on the slaughter lambs production. Due to this fact, the sheep population started falling down to the lowest level in 2008, which was never noticed in the history of Polish sheep breeding. Moreover, the greasy wool production presented the directly proportional trend as it is concerned in the sheep population, however the wool production from one sheep is increasing constantly.

Unfortunately, the ratio of profits from the wool sale to the slaughter lambs sale was decreasing constantly. This effect is caused by the changes in the sheep breed structure. The population of sheep breeds of high wool production as Polish Merino and the Polish Lowland Sheep (originated with the participation of Polish Merino in their genotype) as well as the Polish Longwool Sheep (originated without participation of Polish Merino), which present the uniform type of wool, is reducing in whole sheep breeds population for the benefit of carpet sheep breeds, which breeding is easier.

Also the amount of purchased wool is still decreasing in comparison to the total production level of greasy wool. It results from the fact, that the carpet wool is processed to the own needs or used to product the semi-finish products (e.g. felt), whereas the uniform wool is intended to produce the geo-mats and handicraft decorations.

Key words: sheep, population, wool, purchase