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Sheep husbandry in Poland - an outline

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SUMMARY - The breakdown in agricultural production following introduction of free market economy in Poland in 1989 resulted in dramatic decrease in sheep number from 4.991.000 in 1986 to 890.000 in June 1994, of which 81.6% is kept on private farms. There are 26 sheep breeds kept in Poland, the most important are: Polish Merino (45%), Polish Lowland Sheep (26%), Polish Longwool Sheep (10%) and Polish Mountain Sheep (10%). In 1993, 25.8% of all ewes were under recording scheme and performance recording was carried out in 230 flocks in public sector, with the average flock size of 331 ewes and in 2 129 flocks in private sector, with average size of 59. As the sheep production changed its direction from wool to meat, the major changes in breeding objectives were introduced in 1990 and the new goals were defined as early lamb growth and ewe prolificacy. The selection is based on two-trait index, including lamb body weight at 70 days and mean litter size of its dam and the ratio between economic values for both traits decides on the index pressure towards meat, litter size or dual purpose.

Key words: Polish sheep husbandry, breeding structure, production system, selection programmes

RESUME - Un crise de la production agricole à la suite d'introduction en Pologne en 1989 l'économie de marché libre , à provoqué une baisse dramatique de la population ovine de 4.991 milles de têtes en 1986 jusqu' au 890 milles de têtes au juin 1994. Actuellement 81.6% du cheptel est maintenu au secteur privé. En Pologne on élève 26 races ovines. Les races les plus importants sont: Mérinos polonais (45%), Le mouton de plaine (26%), Le mouton à laine longe (10%), Le mouton de montagne (10%). En 1993 25.8 % de la population a été sous le contrôle de performance. On a soumisé a cet contrôle 230 de troupeau du secteur public (grandeur moyenne du troupeau 331 brebis) et 2.129 de troupeau du secteur privé (grandeur moyenne du troupeau 59 brebis). En consequence de changement d'orientation dans la production ovine (de la production pour la laine vers la production pour la viande) on a profondément modifié depuis l'annee 1990 le but de

l'élèvege. La sélection on a dirigé vers l'amélioration de la croissance précoce des agneaux et l'augmentation de la taille de portée de brebis. On mene la sélection d'apres l'indice basé sur deux traits: le poids d'agneau à 70 jour de la vie et la taille moyenne de portée de sa mère. Une relation entre des importances économiques de ces traits decide de la pression de l'indice vers trois possibles orientations: pour la viande, pour la prolificité où pour l'orientation générale.

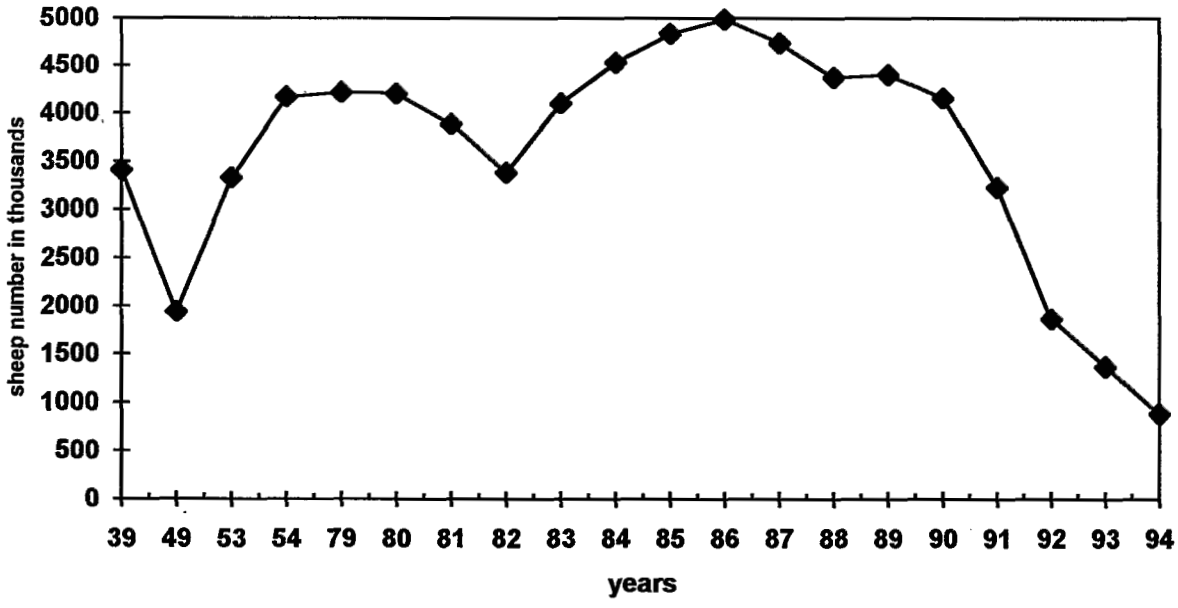
Mots-clés: élèvage de brebis en Pologne, structure de l'élevage, systeme de la production, programme de la sélection

INTRODUCTION

Sheep breeding in Poland has gone through various changes, through times of success and failure, with the earliest records dated back to 13th century, rapidly developing fine-wool production in the beginning of 19th century with the population size over 12 millions, and repeated grave loses during the successive wars.

In 1947, with about 727.000 breeding ewes left, the sheep population started to grow again, especially that home produced wool was needed. The changes in sheep population size after the second World War are presented in Fig. 1.

Fig. 1. Total sheep number in Poland in 1939 - 1994.



The progressive increase of population size in early 1980s' was due mainly to the growing opportunity of lamb export to western Europe and also relatively high wool prices. Introduction of free market economy in 1989 resulted in the breakdown of Polish agriculture, specially in the public sector. The animal production as well as livestock number decreased and this fall was extremely heavy in sheep husbandry. Rapidly decreasing profitability, due to exceptionally low wool prices and fast growing production costs led to dramatic decrease in sheep number. At present the situation seems to be stabilized and a slightly growing interest in sheep production is observed.

SHEEP BREEDS IN POLAND

Polish Merino

The most numerous and genetically stable Polish breed, orginates from the Spanish Merinos and Electoral Merinos, which were being imported to Poland from the late 18th century. Also Merinos of Rambouillet and Precoce types and later Mule and Ile de France as well as Fleischmerinos and Landmerinos were used to upgrade the Merino population in Poland.

Polish Lowland Sheep

This group consists of several different varieties, most of them created on the basis of Polish native primitive breeds (Swiniarka, Leszczynska, Lowicka) crossed with the Polish Merino rams and further upgraded with the English Longwool but also Texel and Leine. Some of the varieties were developed from the Polish Merino and English Longwool crosses only.

Polish Longwool Sheep

There are several varieties included in this group which differ greatly from each other. All of them were created on the basis of local primitive sheep populations , upgraded with different imported breeds, such as Leine, Texel, Romney March or East Friesian and German Whiteheaded Mutton Sheep also Berrichonne du Cher - but always without Merino blood.

Polish Mountain Sheep

It is one of the Polish native breeds which have not changed very much in the last centuries. It orginates from the old Carpathian Cakiel, specially Podhale region variety, and is still kept in the same area - the whole Polish part of the Carpathian mountains. It is a hardy and well adapted breed, the only one which is traditionally milked.

Polish Heath Sheep (Wrzosówka)

The native Polish breed, belonging to the Northern type of short-tailed sheep. The breed almost completely disappeared in the 1950s' due to the low productivity. The successful conservation programme resulted in saving this unique primitive sheep, well adapted to severe conditions and producing high quality pelt.

Imported breeds

There is a number of imported pure breeds which are kept in Poland. Some of them have played an important role in upgrading and improving our sheep populations in the past, like Leine or Romney March. Others, like Suffolk and Berrichonne du Cher, were brought in when terminal crossing was no longer restricted because of quality wool production.

BREED STRUCTURE

The general data on breed structure in ewes under recording scheme and in the whole population is shown in Table 1. In total there are 26 sheep breeds and varieties, 8 synthetic lines and 5 advanced backcrosses populations kept in Poland.

Table 1. The number of ewes under recording scheme on 31st December 1993 and estimated population size on 30th June 1994 (CABO, 1994 and GUS 1993).

Breed	Ewes under recording scheme		Population size
	heads	percentage	
Polish Merino	90.720	45.1	400.000
Polish Lowland	61.834	30.8	230.000
Polish Longwool	20.797	10.3	90.000
Polish Mountain	6.786	3.4	90.000
Polish Heath Sheep	1.577	0.8	2.500
Meat breeds, backcrosses, synthetic lines	16.484	8.2	26.000
Prolific breeds, backcrosses, synthetic lines	1.413	0.7	2.200
Other purebreeds	1.394	07	2.200
TOTAL	201.005		890.473

In June 1993 GUS inventory total sheep number was estimated as 1.267.880 and ewe number as 779.214 (81.6% of sheep and 80.6% of ewes were kept in the private sector). In June 1994 inventory the population size decreased to 890.473 sheep and 560.310 ewes respectively (GUS, 1993).

In December 1993, 25.8% of the total ewe population was recorded, 21.6% of ewes were entered into flock book. As the sheep number has dropped since the end of 1993, the active population makes up now even a greater part of the whole population. Among ewes recorded 62.1% is kept in a private sector.

PERFORMANCE LEVEL

In 1993, the performance recording was carried out in 230 flocks in public sector with the mean flock size of 331.0 ewes and in 2129 flocks of private sector, in average consisting of 58.7 ewes. In Table 2 there is data on reproduction

Table 2. Performance data on sheep breeds kept in Poland (CABO, 1994).

Breed	Prolificacy		Fecundity		Body weight in ewes at 70 days		Body weight in ewes at 12months		Wool yield	
	Public	Priv	Public	Priv	Public	Priv	Public	Priv	Public	Priv
Polish Merino	131.2	141.0	110.5	124.9	20.5	21.5	50.4	53.4	4.8	5.0
Polish Lowland	131.2	150.4	108.3	137.8	19.9	21.9	56.5	53.0	4.9	5.3
Polish Longwool	121.1	145.5	97.7	134.0	18.2	19.5	49.5	53.0	4.4	4.8
Polish Mountain	141.9	132.3	116.4	123.7					4.4	3.9
Polish Heath	148.9	138.1	116.9	121.3					1.6	1.7
Ile de France	130.8	159.4	105.7	141.5	17.9	22.6	50.5	55.8	3.5	4.4
Blackheaded Mut	121.7	135.5	84.9	119.1	22.8	23.1	54.9	47.8	3.8	4.3
Suffolk	132.9	139.4	78.1	102.4	22.9	22.5	54.9	50.0	2.9	3.3
Berrichonne	124.1	144.4	84.6	128.9	24.0	22.8	57.4	51.4	2.6	3.3

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performance and body weight in main sheep breeds kept in Poland in private and public sectors.

Performance level is generaly higher in sheep kept in private farms, especially in litter size and number of lambs reared per ewe mated. Also, early lamb growth is higher in private farms thanks to the better management at lambing and during the rearing period. In most cases body weight in yearlings is in favour for private sector, with the exception of meat breeds.

A comparison between breeds shows relatively small differences between dam breeds and terminal sire breeds in prolificacy; the difference is better pronounced as regards in early growth rate in lambs.

The only breed, which is milked on a commercial scale is the Polish Mountain Sheep. The milk yield is low: 50 - 100 l per lactation (40 - 80 l per milking period) and the milk is traditionally used throughout the grazing season to produce special smoked cheese (oscypek).

PRODUCTION SYSTEMS

Flock size

Table 3 presents the structure of pedigree stock recorded in flock book as the flock size distribution in the whole population is not available,

Table 3. The distribution of flock size in pedigree stock entered into flock book, December 1993 (CABO,1994).

Flock size	Number of flocks	Number of ewes	Percentage of ewes
1 -10	178	1.090	0.6
11-30	716	16.572	9.9
31-50	698	27.869	16.6
51-100	441	30.849	18.4
101-300	169	31.759	18.9
301-500	58	22.720	13.5
501-1000	39	24.920	14.8
0ver 1000	9	12.213	7.3
TOTAL	2.308	167.992	MEAN 72.8

As higher percentage of ewes is kept in private sector than recorded (80.6% v 62.1%) the average flock size in commercial farms is generally lower than presented above.

Farm size and status of property

The most of agricultural production in Poland takes place in private farms which cover 72.4% of agricultural land. The average private farm size is very small - only 7.1 ha (6.3 ha of agricultural land). A slight tendency to increase farm size is observed - in 1992 17.3 % of all farms was of a size 10 ha and over, while in 1980 only 14.3% and in the same time the mean farm size was 6.5 ha and 5.7 ha respectively (GUS, 1993).

The public sector in agriculture is in a transition period with many state farms being privatized and some going through organizational changes to be taken over by the National Landed Property (AWRSP).

Concentration of sheep production is uneven within the country. There are regions where less than 2 sheep are kept on 100 ha of agricultural land (Warsaw voivodship) and the regions where sheep production is of a great importance (Podhale region) where in Nowy Sacz voivodship alone 36.4 sheep /100 ha are kept. The average value for Poland amounts 6.8 sheep/100 ha. Main sheep production areas are located in Poznan, Bydgoszcz, Lublin and Bialystok regions.

Management and feeding

The management of sheep flocks in Poland is relatively simple. Because of climate conditions and strong winters the sheep are housed, traditionally all year around. The grazing season is rather short (May - November) and, as many farms are very small and short of pastures, sheep often have to be fed on a field produced fodder indoors. Summer feeding is based on pasture or green foodder and winter feeding consists mainly of hay and silage, beetroots and straw of average quality. Concentrates are used only in the limited quantity in crucial production periods, like late pregnancy and lambs rearing. In many farms, especially the small ones with only few sheep, concentrates are never used.

Reproduction

Sheep are used for reproduction only once a year. The Merino flock mating season starts in May, the Polish Lowland mating season used to be in August - in order to meet market demands for export lambs it has been changed for June in many flocks.The Polish Longwool sheep are showing stronger seasonality and they are tupped in September. Majority of ews is naturaly mated and in big pedigree flocks ewes are always handmated .Artificial insemination is very limited and used mainly in case of the Polish Mountain sheep. Lambs are weaned at 3 months, some of them are sold before weaning as light export lambs.

Production profitability

In general, agricultural production in Poland is relatively low profitable in comparison with other economic sectors. With 26 % of economically active population working in agriculture only 8.6% of gross domestic product per capita comes from this sector (GUS, 1993). Sheep production in that respect is in the worst situation comparing with dairy or pig industry. According to the Seremak-Bulge estimates (1993) the sheep production may only be profitable with the minimum flock fecundity of 150% and lambs sold at body wieght ranging from 28 to 35kg. Even in that situation predicted gross margin per ewe is extremely low (5-6.5 USD).

GENETIC IMPROVEMENT PROGRAMMES

Technical description

The genetic improvement work in sheep population in Poland had started in 1960s' when the Progeny Testing Stations for rams were established. This method was used till 1980 and resumpted in 1986. Breeding value estimation on the basis of own performance was initiated in 1967 and it is continuing since then. Over the last 20 years several selection indices were developed and introduced into practice (Nawara, 1969, Tecza, 1971 and Klewiec, 1983). As in 60s', 70s' and early 80s' the main source of income in sheep farming used to come from wool production, the wool yield and wool quality were the main breeding objectives.

An increasing interest in meat production, stimulated by growing export of slaughter lambs followed by breakdown in wool prices after 1989, led to reconsideration of breeding goals in Polish sheep breeding and to intensification of commercial crossing.

A development of new breeding programme and selection indiced was started in 1990 (Rzepecki, 1990); the final indices based on genetic parameters estimated in 1993 were proposed by Rzepecki et al. (1993).

Selection in main dam breeds is based on two-trait index which includes mean prolificacy of a dam and own lamb body weight at the age of 70 days. Till 1994 only ram-lambs were indexed, from 1995 ewe-lambs will be included. For Polish Merino, Polish Lowland, and Polish Longwool flocks there are three breeding objectives available to a flock owner: meat, prolificacy or dual purpose. Depending on the objective there are different economic values to calculate index regressions. The relative economic values for ewe prolificacy:lamb body weight are respectively: 390:30, 900:30 and 600:30. In the case of terminal breeds and their backcrosses there is only one breeding goal: meat, and the relative economic values are 240:30.

The breeding value is estimated using the following formula:
$I = 50 + b_1 (x_1 - m_1) + b_2 (x_2 - m_2)$
where:
- b_1 and b_2 - regression coefficients, different for each breeding objective
- x_1 - average litter size of dam
- m_1 - population mean, assumed as 1.00

- x_2 - body weight at 70 days, adjusted for type of birth (single) and dam age (2-4 years old).
- m_2 - population mean for the breed within the breeding objective

The indices are calculated in Sheep and Goats Breeding Department of the National Research Institute of Animal Production.

As the number of lambs born is the main factor to influence the profitability of sheep farming, the programme on prolificacy improvement in national sheep population was introduced in 1994. The programme aims to improve litter size by upgrading Polish local dam breeds like Polish Merino, Lowland and Longwool sheep through crosbreeding with prolific breeds available in the country, e.g. East Friesian, Finn, Olkuska, Romanov and Booroola. The final genotype should contain 1/4 of the prolific and 3/4 of the local breed genotype. The first F1 progeny from this programme was born in winter 1994, F1 rams will be used in the next season for crossing with ewes both in pedigree and commercial flocks.

For some breeds like Polish Mountain Sheep, Olkuska or Polish Heath Sheep there are specific breeding objectives and programmes aiming to improve milk production, litter size and conservation the breed as a source of genetic diversity.

At the moment there is no special crossbreeding programme in Poland. In many flocks commercial crossing is used; usually it is one way terminal crossing with the rams of meat breeds like Suffolk, Berrichonne du Cher, Blackheaded Mutton and Ile de France or rams of the synthetic meat lines. There are many research work carried out in the field of crossbreeding effects and components evaluation both in Sheep Breeding Departments of Agricultural Universities and in the National Research Institute of Animal Production.

Organization of recording scheme

Till 1995 performance recording was carried out by sheep specialists from Regional Animal Breeding Offices (17) with the Central Animal Breeding Office supervision of breeding programmes implementation. New breeding programmes or any modifications of the existing ones are developed by scientific teams, usually under the leadership of the National Research Institute of Animal Production with the approval by the Ministry of Agriculture and Food Economics.

In January 1995 the Ministry has decided to transfer responsibility of supervision of the breeding work and performance recording from Regional/Central Animal Breeding Offices to the Polish Sheep Breeders Association. The sheep sector is the first one to examine such a solution and its example will influence further development of this process as regards other species.

Scientific and technical support

Sheep husbandry in Poland was developed with the support of research work carried out in nine Animal Breeding Faculties of Agricultural Universities and three main research Institutes: the National Research Institute of Animal Production in Cracow, Institute of Genetics and Animal Breeding in Jastrzebiec and Institute of

Animal Nutrition in Jablonna. The main field work and the farm extension used to be performed by sheep specialists from Regional Animal Breeding Offices. There were 128 sheep specialists employed in RABOs/CABO in 1994.

Limited extension services are also provided by the Advisory Agricultural Services set up in voivodship agricultural departments.

Financing

Every pedigree breeder included in the recording scheme is expected to conribute in covering the costs of recording services, the fee varies depending on the region.

A development of breeding programmes and spreading genetic progress throughout the whole sheep population is supported by the Ministry of Agriculture and Food Economics, the Biological Development Fund (Ministry Instruction, 1995).

There are special premiums which are paid to the pedigree breeder when his stock is sold out, which allows farmers cheaper purchase of breeding animals, especially males. The premium for selling a breeding ram depending of his value varies from 180 to 117 USD in 1995. There are other premiums available: 42 USD for two-tooth replacement ewe in pedigree flock and 33 USD for ewe-lamb sold to a new established meat or prolific purebred flock. In the last two years there were special temporary premiums for replacement ewe-lamb in commercial flock (17 USD) to encourage increasing the sheep production.

To assist implementation of the new prolificacy improvement programme there is a special premium available for those breders who have decided to join the scheme (29 USD per ewe included in the programme, 42 USD per F1 ewe-lamb sold out from the programme).

There is also a small continuing support for several breeds regarded as genetic diversity resource, which amounts17-19 USD per ewe (in total 45 455 USD).

The total direct support for sheep breeders in 1995 is astimated on 3 471 074 USD what makes about 7.3% of the whole amount provided for all domestic animal species. Apart from the direct financing of replacement of the breeding stock, a part of the Biological Development Fund is allocated to cover recording services which used to be provided by Regional Animal Breeding Offices. This support will be transfered to the Polish Sheep Breeders Association from 1995 onwards.

Results obtained

As the breeding objectives changed very much in the last years and the new selection indices in their final formula were introduced only in 1994, it is too early to evaluate genetic progress or phenotypic gain obtained yet.

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