The analysis of reproductive parameters in sheep of mixed wool in Poland in the years 2005-2015

Analiza wskaźników rozrodu owiec o wełnie mieszanej w Polsce w latach 2005-2015

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Abstract

The aim of this paper was to analyse the reproductive parameters (fertility, prolificacy, number of lambs raised and reproductive performance) in sheep of mixed wool in Poland in the years 2005-2015. In the years subject to analysis a decline was observed, both in the population of sheep and in the population of ewes of all breeds and varieties entered in the herd books in Poland. A growth was noticed, however, in the population of four conservation breeds (heath sheep, świniarka sheep, coloured Polish mountain sheep and podhale zackel sheep), which constituted in 2015 25.6% of domestic population of ewes entered in the herd books. The growing number of the studied ewes' populations was nevertheless parallel with negative development tendencies in terms of the evaluated reproductive parameters.

Keywords: conservation breeds, reproductive parameters, sheep

Streszczenie

Celem pracy była analiza wskaźników rozrodu (płodności, plenności, odchowu jagniąt i użytkowości rozpłodowej) owiec o wełnie mieszanej w Polsce w latach 2005-2015. W badanych latach zaobserwowano zarówno spadek pogłowia owiec, jak i maciorek wszystkich ras i odmian wpisanych do ksiąg zarodowych w Polsce. Odnotowano, natomiast wzrost populacji czterech ras zachowawczych (wrzosówki, świniarki, polskiej owcy górskiej odmiany barwnej i cakla podhalańskiego), które stanowiły w 2015r. 25.6% krajowego pogłowia maciorek wpisanych do ksiąg zarodowych. Zwiększaniu się wielkości ocenianych populacji maciorek towarzyszyły negatywne tendencje rozwojowe w zakresie ocenianych wskaźników rozrodu.

Słowa kluczowe: owce, rasy zachowawcze, wskaźniki rozrodu

Introduction

For many years the sheep population in EU countries, including Poland, has been decreasing systematically (Polish Sheep Breeding Association, 2005-2016; Food and Agriculture Organization of The United Nations Statistics Division, 2016). The dominant meat direction in sheep farming does not bring measurable economic benefits, which in turn does not result in the increase of the population of those animals. Thus, in recent years the attempts are being made at solving the sheep farming crisis. Sheep are typical grazing animals. In favourable climate conditions pastures may constitute even up to 95% of sheep' diet (Hodgson et al., 2005). Therefore the effective use of existing permanent pastures is one of the simplest methods of lowering the costs of sheep farming (Drożdż, 2004; Musiał et al., 2006; Arsićet et al., 2015). In many countries breeders are encouraged to practice extensive rearing or breeding, which also significantly affects protection of ecosystems and preservation of biodiversity (Arsić et al., 2015). Additionally, grazing on natural meadows and pastures positively influences the quality of sheep-farming products, which owing to their nutritional value and health benefits are promoted in industrialized countries (Campo et al., 2008; Montossi et al., 2013). A vital activity improving the effectiveness of sheep farming and simultaneously increasing its attractiveness is rearing sheep in small farms - agro-tourism and ecological ones where local breeds are particularly appreciated, as the ones adapted to climate conditions of a given region. Native breeds, from the genetic viewpoint are a valuable contribution to sustainable ecological and economic development of the region (Ruane, 2000;Tempelman and Cardellino, 2007). Such breeds not only play a crucial role in cost-efficient farming systems but also, in various ways, support rural communities of both developed and developing countries (Drucker et al., 2001). Local breeds are often a point of reference for old traditions, protecting in such a way the cultural heritage. They contribute remarkably to preserving typical rural landscapes, historically linked to farming of a given breed (Gandini and Villa, 2003). The sheep breed structure in many countries does not reflect the dominant meat direction of farming. Meat breeds most frequently represent the smallest part of the population, however in recent years a growing interest in local breeds has been recognised. For instance in Slovakia there is very low breed diversity. In 1997 80% of total number of sheep kept in this country was made up of breeds representing versatile direction of utility (42% valachian breed and 38% cygaj breed). The remaining part of breed structure was made up of merino sheep (19%) and meat sheep breeds (suffolk, ile de france, charollaise, berrichon du cher, oxford down - 1% altogether) (Margetín and Michalík, undated). In Czech Republic, like in Poland, the dominant direction of sheep utility is meat. Breed structure of sheep is also diversified. In 1995 among the most important breeds the following were listed: merino sheep, walaska sheep, cygaj sheep, sumava, meat breeds (such as: suffolk, charollaise, texel) and prolific breeds (Finnish, Romanov), (Sereda, undated). The most important breeds in Hungary are merino sheep, constituting over 80% of domestic population, while only 2.5% of the population is made up of native breeds (e.g. gyimesi racka, hortobagyi racka, cikta, tsigai, hungarian milkong tsigai), (Budaiet et al., 2013). Popularity of local breeds is connected with state subsidies within the framework of programs of such breeds' protection being carried out. In Czech Republic in 2013 two sheep breeds have been included in The National Program of conservation breed protection: sumavska sheep and valachian sheep

(Mátlová, 2013). In Serbia the native breeds covered by „in situ” protection are: krivovirska, pirotska, lipska, bardoka, karakačanska, vlaška vintoroga, cigaja, svrljiška and sjenička (Stančić and Stančić, 2013). In Slovakia territory the valachian sheep breed is protected within the preservation of genetic resources program (Tomka et al., 2013). In Poland since 2005 the majority of local breeds has been protected within the preservation of sheep genetic resources program. Initially 11 breeds defined as conservation breeds were included in the program (corriedale, kamieniecka, olkuska, pomeranian, uhruska, wielkopolska, żelaźnieńska, coloured merino, heath sheep, świniarka sheep, coloured Polish mountain sheep). In 2008 old type of merino sheep and podhale zackel sheep were added to the program and from January 2015 also black-headed sheep and Polish pogórze sheep. In total 15 sheep breeds are included in conservation breeding programs in Poland (Owce. Bioróżnorodność, 2016). The measurable indicators of profitability in sheep farming are the parameters of small ruminants' reproduction (fertility, prolificacy, number of lambs raised and reproductive performance), which in case of local breeds reach standard values (Niżnikowski et al., 2007a; Piwczyński et al., 2013). Thus, in spite of growth in the number of this breed group a significant improvement in sheep farming effectiveness should not be expected. One of the most widespread breed groups in southern Europe (in Greece, Carpathian and Balkan territory, in Hungary) are primitive sheep of versatile utility - zackel. Greek zackel is recognised as the most primitive breed. In Bulgaria there are Bulgarian zackel sheep, called bukewei, and Balkan zackel is also known as 'skutarska' sheep. Balkan zackel sheep are common in the entire Yugoslavia territory, in various varieties (Parmenka, Sjenicka). Hungarian zackel, also known as 'raczka', is a primitive sheep from Transylvania region. It is common also in Romanian part of the Carpathian mountains and in Slovakia. Transylvania zackel may also be found on southern slopes of the Carpathian mountains. The local name of Romanian zackel is 'Tsurcana' and its prolificacy fluctuates between 110% and 115%. In Poland there are two types of Polish zackel: Beskidy zackel in the Beskidy mountains and Tatra zackel (or podhale zackel) In Poland its prolificacy in the breeding program was defined as at least 105% (Kawęcka, 2007; Owce Bioróżnorodność, 2016). The reproductive parameters of zackel sheep group are low. In Budai et al. (2013) studies the reproductive parameters of two breeds: Tsurcana and Gyimesiracka were respectively: fertility 96.11% and 93.29%, prolificacy 118.94% and 105.78%, number of lambs raised 97.32% and 97.7%. The original Valachian breed, popular in Slovakia, in the years 2010-2012 obtained fertility of 90.3%, and prolificacy of 136.4% (Margetín et al., 2013). In spite of low reproductive parameters, for each of the countries, the local breed is not only an important gene reservoir, but also represents a sort of cultural heritage. Along with rearing and breeding of native breeds the sheep farming traditions are preserved. Dynamic changes which have occurred in the quantity and structure of sheep population in Poland in the last dozen of years made authors analyse the development tendencies in terms of reproductive features of domestic population of ewes. The aim of this paper was to analyse the reproductive parameters of 4 mixed wool sheep breeds (heath sheep, świniarka sheep, coloured Polish mountain sheep and podhale zackel sheep) covered by the genetic resources conservation program in Poland. On the basis of reports published by Polish Sheep Breeding Association in the years 2005-2015 the size of those sheep populations was assessed and the features connected with reproduction were analysed: fertility, prolificacy, number of lambs raised and reproductive performance.

Materials and methods

The study covered mixed wool sheep representing 4 conservation breeds: heath sheep, świniarka sheep, coloured Polish mountain sheep and podhale zackel sheep. On the basis of the annual reports published by Polish Sheep Breeding Association, the features connected with ewes' reproduction were analysed (%): fertility, prolificacy, number of lambs raised and reproductive performance, which was calculated using following formulas (PSBA, 2006-2016):

$$\text{fertility} = \frac{\text{all mothers lambing}}{\text{all mothers in the herd}}$$

$$\text{prolificacy} = \frac{\text{all lambs born}}{\text{all mothers lambing}}$$

$$\text{rearing lambs} = \frac{\text{all lambs reared}}{\text{all lambs born}}$$

$$\text{reproduction performance} = \frac{\text{all lambs reared}}{\text{all mothers in the herd}}$$

The numerical data was processed statistically, calculating the arithmetic average and coefficient of variation (CV). The reason for lack of available data in tables in the years 2005, 2006 and 2007 for the results of podhale zackel sheep is the fact that that breed was not included in the sheep genetic resources program before 2008. The results obtained were then listed in dynamic series, owing to which the development tendencies were identified by means of analytical method in the form of linear mathematical function: $y_t^{'} = a + b_t$, where:

t – time expressed in years,

a – level of the analysed variable in the zero moment (year 2005),

b – directional coefficient displaying the average annual rate of increase or decrease of the variable level.

In order to evaluate the quality of the linear model the coefficient of determination was calculated (R^2). Statistical analysis was conducted with the use of statistical package StatisticaPL ver. 8.0 (Statistica).

Results and discussion

The sheep population in the world in the years 2005-2014 showed positive growth, the average annual increase of approximately 6 million whereas the sheep population in EU decreased in each subsequent year by approximately 1.7 million (Table 1). According to Food and Agriculture Organization of the United Nations, (FAOSTAT, 2016) the countries with the largest sheep population are China and India. The reason for the growing interest in sheep breeding in Asia may be the versatility of sheep utility (meat, wool, milk, skins) and their low dietary requirements. The above arguments are crucial given the demographic growth in that region and its landscape (steppes and mountain meadows). Australia, which has for many years been associated with sheep breeding and wool production is no longer among the world leaders. Currently the sheep population there is 75.5 million, which constitutes 6.5% of the world population (FAOSTAT, 2016).

Table 1. Population of sheep in the world, in EU and in Poland in the years 2005-2015 (FAOSTAT[1], PSBA)

Years	World[1], millions	European Union[1], millions	Poland, number
2005	1,115.53	111.16	317,669
2006	1,123.46	109.48	301,397
2007	1,137.77	107.71	315,563
2008	1,125.49	104.25	269,627
2009	1,118	101.9	224,034
2010	1,119.4	99.79	213,654
2011	1,139.91	98.67	212,740
2012	1,105.7	96.53	218,507
2013	1,131.87	97.67	223,057
2014	1,209.91	97.66	201,270
2015	n.d.a.	n.d.a.	221,186
Trend analysis			
Equation of trend ratio	y= 5.9783x+1,092.1	y= -1.7217x+113.72	y= -11,355x+326,264
Coefficient of determination R^2	0.39	0.93	0.77

[1] latest available data presented by FAO regard 2014

n.d.a. – no data available

According to data from PSBA in the years 2004-2015 there was a decline in the domestic sheep population (PSBA, 2005-2016). The regression equation presented in Table 1 shows that in each year the number of sheep in the country fell on average by 11,355. In December 2015 their population dropped to the level of 221.2 thousand and was lower by 96.5 thousand in comparison to the quantity in December 2005 The number of sheep in Poland currently constitutes 0.23% of the overall sheep population in EU.

Table 2. Total number of ewes and the number of ewes of mixed wool conservation breeds entered in the herd books in Poland in the years 2005-2015 (PSBA, 2006-2016)

Years	Total number of ewes, number	Ewes of mixed wool conservation breeds	
		number	% of total number of ewes
2005	97,219	3,406	3.5
2006	97,872	5,001	5.11
2007	71,487	7,587	10.61
2008	67,643	13,978	20.66
2009	69,549	12,385	17.81
2010	60,706	13,093	21.57
2011	72,005	14,246	19.78
2012	76,817	16,287	21.2
2013	81,027	17,888	22.08
2014	84,083	18,986	22.58
2015	86,282	22,125	25.64
Trend analysis			
Equation of trend ratio	$y = -1{,}243.9x + 84{,}682$	$y = 1{,}699.2x + 2{,}984.7$	
Coefficient of determination R^2	0.09	0.93	

The change of direction in the utility of those small ruminants has not improved the several-decade long crisis in Polish sheep farming. The introduction of meat direction in sheep utility has also failed to contribute to the increase in sheep population in the country. One of the reasons for unprofitability in sheep breeding in Poland is the sheep breed structure which is not in line with the market demand (Rokicki, 2009; Mroczkowski, 2011). In 1986 in Poland the dominant breed was merino sheep, representing the wool and meat direction, constituting 96.1% of the share of ewes entered in herd books of particular breeds and varieties of sheep. There were only 0.9% of meat breed ewes (PSBA, 1987). In 2015 the meat breeds constituted 6.9% of the population of ewes entered in herd books, and most of them, namely 80.6%, were ewes of native breeds representing mainly wool and meat direction of utility (PSBA, 2016). The recent growth observed in the breeders' interest in native conservation breeds is closely linked to the subsidies received by those of them who participate in the Sheep Genetic Resources Conservation Program.

Table 2 shows the number of ewes of all breeds and varieties (in total) and the number of mixed wool conservation breed ewes entered in herd books in Poland. The population of 97,219 ewes in total in 2005 dropped to 86,282 in 2015. The established directional coefficient (regression coefficient) leads to the conclusion that the average decrease in the number of females of all breeds and varieties was 1,244.3 sheep per year. In the same years (2005-2015) positive development tendencies were observed regarding the population of ewes of conservation mixed wool breeds, which might be the effect of including those breeds in the program of conservation breeding. Very high value of the calculated coefficient of determination (R^2= 0.93) indicates that the mathematical model - regression equation anticipates well the development tendency in terms of number of assessed ewes of mixed wool conservation breeds (Table 2). The assessed females in 2005 constituted 3.5% of the entire population of ewes in the country entered in herd books while in 2015 that percentage was 25.64% (Table 2).

Among four analysed mixed wool sheep breeds the ones with the highest annual average growth rate and the highest number of ewes entered in herd books were heath sheep and podhale zackel sheep. In 2015 the population of females of those breeds was, respectively: 9,261 and 8,612 (Table 3). The lowest number was that of coloured Polish mountain sheep: 1,987. In the years 2005-2015 a very high forecast quality of the regression model was recorded in terms of the number of ewes of all assessed breeds. The value of coefficient of determination (R^2) fluctuated between 0.88 for podhale zackel sheep, coloured Polish mountain sheep and świniarka sheep and 0.76 for heath sheep (Table 3).

Table 4 presents the average level of reproductive features for the assessed sheep in the years 2005-2015. In the analysed period the highest average fertility was observed among podhale zackel sheep (99.46%) and coloured Polish mountain sheep (99.32%), and the lowest - among świniarka sheep 94.89%. High fertility of coloured Polish mountain ewes, from 97.9% to 99.7%, was noted by Kawęcka in her study (2009), while for świniarka ewes the value of this parameter according to Kawęcka (2011) was more diversified and fluctuated between 84% and 99%.

Table 3. The number of ewes of mixed wool conservation breeds entered in the herd books in Poland in the years 2005-2015 (PSBA, 2006-2016)

Years	Heath sheep, number	Świniarka sheep, number	Coloured Polish mountain sheep, number	Podhale zackel sheep, number
2005	2,818	338	250	-
2006	4,251	417	333	-
2007	6,366	559	662	-
2008	8,334	687	593	4,364
2009	7,170	620	525	4,070
2010	7,352	690	615	4,436
2011	7,602	869	859	4,916
2012	8,444	1,128	1,104	5,611
2013	8,955	1,458	1,354	6,121
2014	8,949	1,625	1,543	6,869
2015	9,261	2,265	1,987	8,612
Trend analysis				
Equation of trend ratio	y = 540.24x + 3,986	y = 166.32x - 29.182	y = 154.15x - 31.745	y = 589.06x + 1,206.9
Coefficient of determination R^2	$R^2 = 0.76$	$R^2 = 0.86$	$R^2 = 0.88$	$R^2 = 0.88$

The population standard of a given breed included in Sheep Genetic Resources Conservation Program defines only the requirements concerning fertility of świniarka sheep and heath sheep. Both breeds obtained the average, the minimum and the maximum fertility parameters above the standard, which was, respectively: 90% and 95% (Owce Bioróżnorodność, 2016). The calculated variation rate for prolificacy of all assessed breeds was low and varied from 0.34% for podhale zackel sheep to 2.32% for świniarka sheep (Table 4).

Table 4. Statistical characteristics of reproductive features (%) for mixed wool conservation sheep breeds in the years 2005-2015

Feature	Statistical measure	Breed			
		Heath sheep	Świniarka sheep	Coloured Polish mountain sheep	Podhale zackel sheep
Fertility	$\bar{x}$	97.73	94.89	99.32	99.46
	$x_{min.}$	96.8	92.5	97.9	98.9
	$x_{max.}$	99	99.3	100	99.9
	CV	0.73	2.32	0.7	0.34
Prolificacy	$\bar{x}$	133.86	119.54	127.19	127.64
	$x_{min.}$	124	108.8	109.1	124.2
	$x_{max.}$	149.5	131.1	133.2	131.4
	CV	5.6	5.13	5.88	1.74
Lambs raised	$\bar{x}$	88.6	91.71	94.54	94.45
	$x_{min.}$	84.7	86.6	92.8	92.3
	$x_{max.}$	96.9	97.3	96.9	96.4
	CV	3.55	3.37	1.38	1.7
Reproductive performance	$\bar{x}$	113.99	104.05	119.45	119.99
	$x_{min.}$	103.3	90.7	101.7	115.5
	$x_{max.}$	131.5	124.2	128	126.2
	CV	7.67	7.82	6.19	2.77

$\bar{x}$ - average value

$x_{min.}$ - minimum vaule

$x_{max.}$- maximum value

CV - coefficient of variation

Negative values of directional coefficients (regression coefficients) regarding the fertility of ewes indicate unfavourable development tendencies in terms of that feature (Figure 1). Very low value of coefficient of determination (R^2 from 0.18 to 0.02) suggests that the assessed linear function of fertility trend is insufficiently matched to empirical data (Figure 1). Unfavourable fertility trends in prolific breeds' ewes in Poland (Finnish sheep, Frisian sheep and Romanov sheep) in the years 1997-2010 was recorded also by Piwczyński et al. (2013), whereas in the years 1995-2009 Piwczyński and Mroczkowski (2011) observed positive tendencies in terms of fertility for the population of Polish merino sheep, Pomeranian sheep and heath sheep.

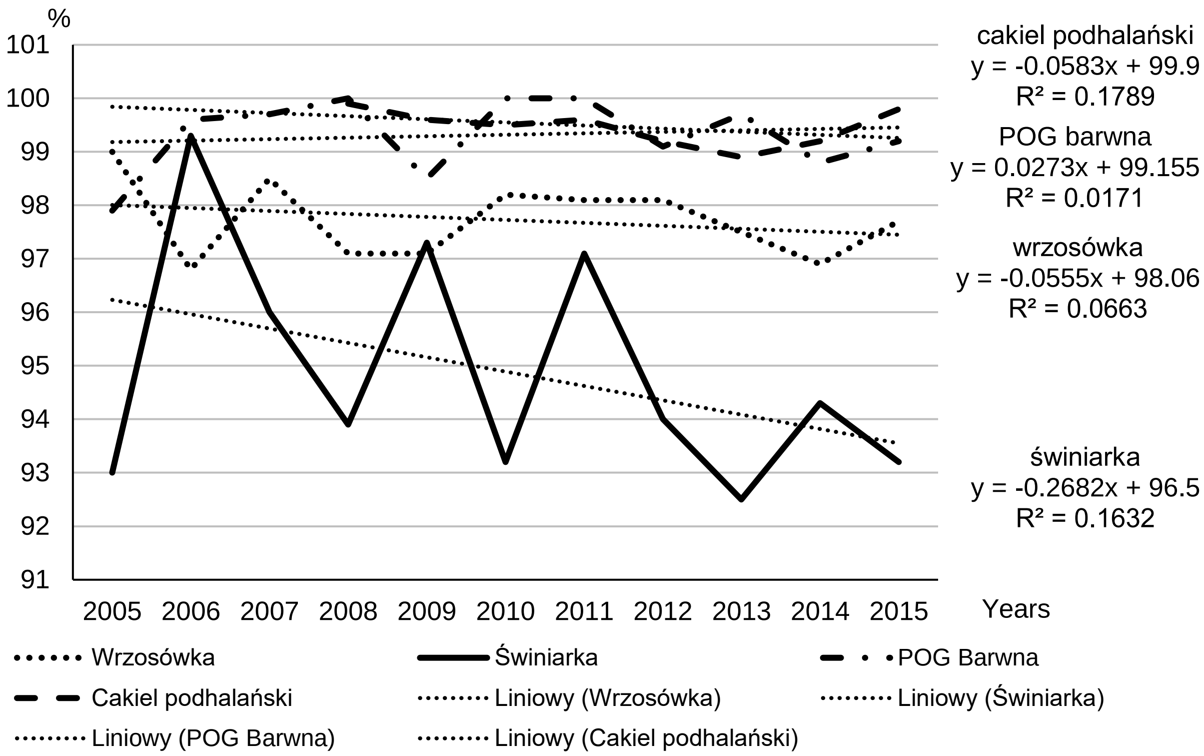

Figure 1. Trends in ewes' fertility

In accordance with the breed standard, among the four evaluated conservation breeds only heath sheep is characterized by high prolificacy. In case of this breed its prolificacy should be on the level of at least 150% (Owce Bioróżnorodność, 2016). Heath sheep is a breed with fertility maintained practically regardless of season. Niżnikowski et al. (2007b) recorded this breed's prolificacy as 211%, and Kawęcka (2011) in 2009 as 121%. During the in-house research in the years 2005-2015 (Table 4) the average litter of one heath sheep ewe was 1.3 of lamb and the value of the feature was fluctuating in the narrow scope of 124% and 149.5% and did not reach the minimum value of breed standard in any of the analysed years. Negative tendencies in terms of prolificacy of heath sheep females, Pomeranian sheep and merino sheep in Poland were recognised also by Piwczyński and Mroczkowski

(2011). Milewski (2010) suggests that poor prolificacy of ewes may be caused by inappropriate preparation of females to reproductive season. Proliferacy which approximated breed standard (120%) was observed among ewes of świniarka sheep, which amounted to 119.5% in the course of the analysed years. Higher prolificacy in comparison to standards (Gruszecki and Lipecka, 2007; Owce Bioróżnorodność, 2016) was obtained by podhale zackel sheep and coloured Polish mountain sheep, respectively: 127.64% and 127.19%. Simultaneously, the coefficient of variation (CV) for prolificacy of podhale zackel sheep females was 3 times smaller than the coefficient for remaining breeds and amounted to 1.74 (Table 4).

The analysis of prolificacy trends shows the annual decrease of this feature's value in ewes of heath sheep and podhale zackel sheep, respectively by: 2.11 and 0.37% (Figure 2). A positive development tendency in terms of prolificacy could be observed in coloured Polish mountain ewes and świniarka ewes. The directional coefficient (regression coefficient) established in linear model showed annual increase of both breeds' ewes prolificacy, in case of świniarka by 1.03%, and in case of coloured Polish mountain sheep by 1.27%.

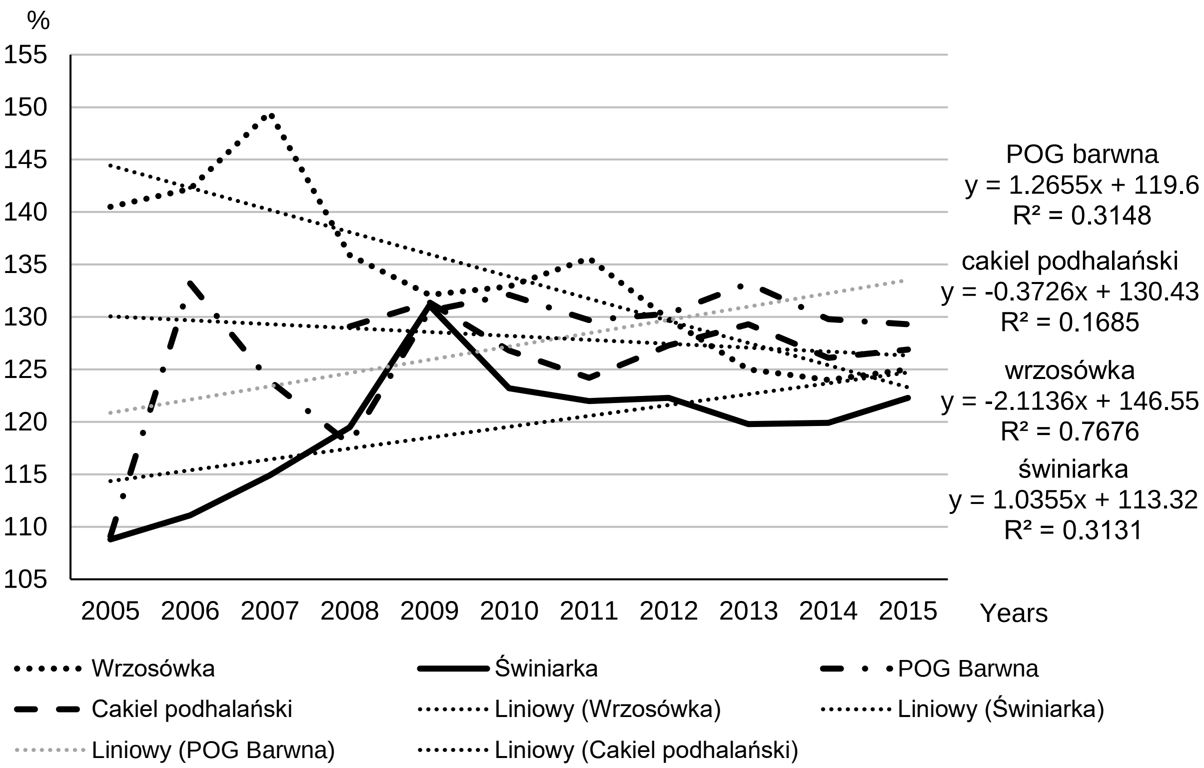

Figure 2. Trends in ewes' prolificacy

The conducted study showed that the highest prolificacy among the four assessed mixed wool conservation breeds is that of heath sheep ewes (Table 4). High prolificacy was associated with the recorded lowest number of lambs raised, which in case of heath sheep ewes was on average 88.6% in the course of years covered by the analysis. Low number of lambs raised for heath sheep was also recorded by

Niżnikowski (2007b) and Piwczyński and Mroczkowski (2011) - approximately 92%. Better results in the number of lambs raised were noticed in case of świniarka sheep - approximately 91.71% of lambs survived until weaning from their mothers. In case of świniarka sheep the highest parameter of number of lambs raised was also recorded (x_{max}=97.3%). The level of raising lambs for coloured Polish mountain sheep and podhale zackel sheep was similar and varied, respectively: from 94.54% to 94.45%. Variability of this feature for both breeds was the lowest and fluctuated between 1.38% and 1.78% (Table 4). It has to be noted that mortality of lambs in case of each evaluated breeds was high and exceeded the threshold of 5%. Lambs born from the numerous litter may be less developed and as such may have lower vitality (Milewski, 2010). Raising of lambs for świniarka and heath sheep breeds was characterised by the largest fluctuations in the subsequent years, which is confirmed by the minimum and maximum value of that feature, namely: for świniarka sheep - 86.6% and 97.3%, for heath sheep 84.7% and 96.9% (Table 4, Figure 3). Regardless of breed the slope of the trend line in number of lambs raised indicates a decreasing tendency, while the annual decline in the value of this feature was from 0.13% (coloured Polish mountain sheep) to 0.56% (podhale zackel sheep), (Figure 3). High coefficient of determination for raising lambs for podhale zackel sheep (R^2=0.72) indicates that the determined regression equation negatively forecasts the development tendency regarding the number of lambs raised for this breed.

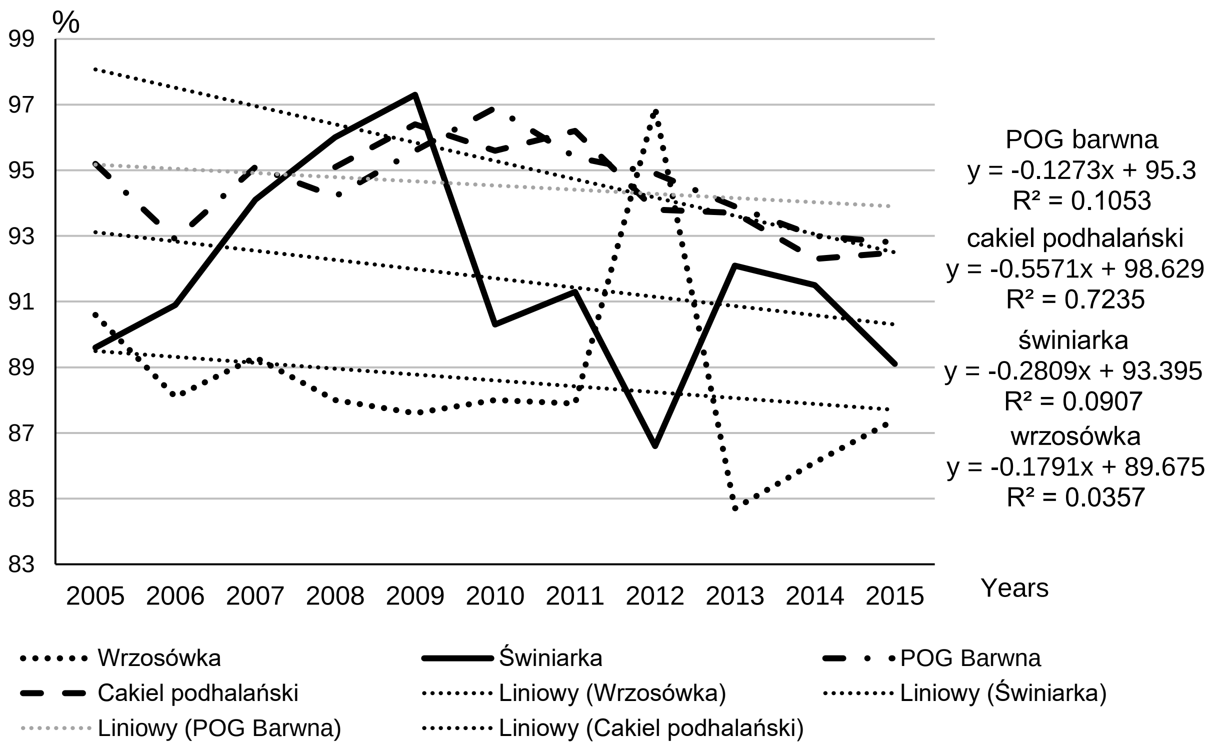

Figure 3. Trends in lambs raised

Reproductive performance parameter is the resultant of fertility, prolificacy and number of lambs raised. It must be said, however, that this parameter is not sufficiently precise since it does not take into account barren ewes, twin litters or mortality of lambs. Still, it is used in practice, especially during production planning and farm management. Of all reproductive features it has the largest impact on profitability of the production (Piwczyński and Mroczkowski, 2011). The average reproductive performance for four mixed wool conservation breeds was very low in the years 2005-2015 and varied from 104.05% for świniarka sheep to 119.45% for coloured Polish mountain sheep and 119.99% for podhale zackel sheep (Table 4). The differences in percentage of approximately 30 units between maximum and minimum value of reproductive performance in case of: świniarka sheep, heath sheep and coloured Polish mountain sheep prove the high variations of this feature in the course of the analysed years. The value of this feature among all the evaluated reproductive parameters was characterised by the highest variability (CV) from 6.19% for coloured Polish mountain sheep to 7.82% for świniarka sheep (Table 4). Low parameters of reproductive performance for coloured Polish mountain sheep (from 101.7% to 123.2%) was also obtained by Kawęcka (2009).

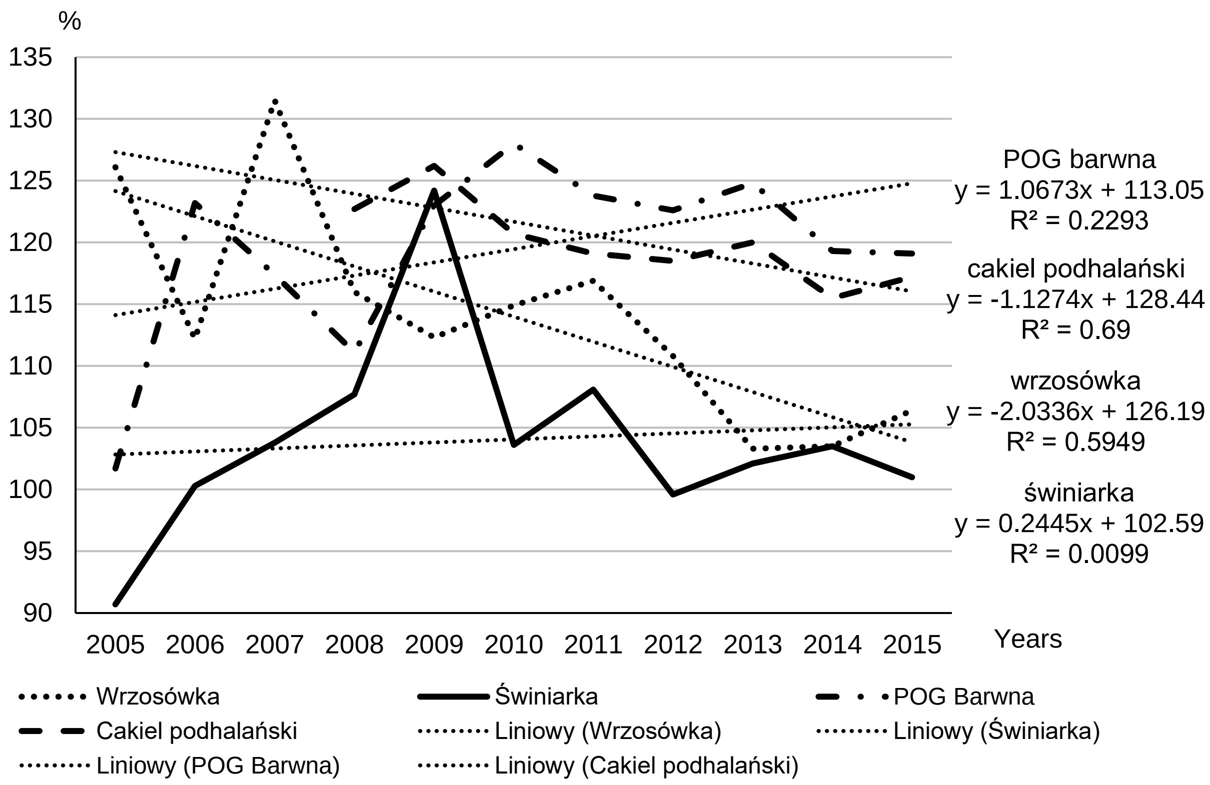

Figure 4. Trends in reproductive performance of ewes

Development tendencies of reproductive performance defined during the in-house research were negative for heath sheep and podhale zackel sheep (Figure 4). The largest decline of this parameter was observed in the group of heath sheep ewes: 2.03%/per year, which is confirmed by the results obtained by Piwczyński and Mroczkowski (2011). In herds of coloured Polish mountain sheep ewes and świniarka ewes the reproductive performance improved in each year by, respectively: 1.07% and 0.24%. Despite recording the highest directional coefficient of regression equation for świniarka reproductive performance, the established coefficient of determination (R^2=0.009) proves an insufficient matching of the established mathematical model, i.e.: equation to the results of analysed studies.

Conclusion

To sum up, it has to be stated that in the years 2005-2015 sheep population in Poland decreased by nearly 100 thousand. Consequently, the population of ewes entered in herd books decreased by nearly 10 thousand. In spite of the drop in sheep population a significant growth was noticed in the number of ewes of mixed wool conservation breeds entered in herd books. The increase in the share of 22% that group of ewes in the total number of ewes. For each breed assessed within the framework of the study (heath sheep, świniarka sheep, coloured Polish mountain sheep and podhale zackel sheep) positive growth tendencies were observed. Most probably being the effect of including those breeds in the program of conservation breeding. The largest population growth was recorded for heath sheep ewes and podhale zackel sheep ewes. Were observed negative development tendencies in the aspect of reproductive features (fertility, prolificacy, number of lambs raised and reproductive performance) in all assessed breed groups. In most cases the decrease in reproductive parameters was noted and the few presented positive trends were characterized by very low directional indicator. It should be remembered that the low level of reproductive features of native sheep breeds is genetically determined and including those breeds in „in situ” protection limits the possibilities of improving those parameters. Notwithstanding their lower productivity local breeds may compete with e.g.: meat breeds in terms of product quality, health benefits and longevity. With satisfactory reproductive parameters they may even find their niche in food production. Currently sheep farming is not limited to meat and milk production. The role sheep play in the process of shaping the landscape and rural development should not be forgotten. They are a vital part of Polish highland tradition and cultural heritage. Only a comprehensive approach to sheep breeding may help to improve the present situation.

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