Polish Red Cattle breeding: past and present

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Summary

The aim of this study was to characterise the Polish Red cattle breed, the only existing native breed in Poland. The origin and conformation of this breed and its historical development, distribution and performance were described. Moreover, the attention was paid to the attempts to improve the breed milk performance by crossbreeding with Jersey, Danish Red and Angler and beef performance by crossbreeding with Black-and-White, Red-and-White, Simmental and beef bulls.

Before the Second World War the Polish Red held the rank of an international breed, and since the middle of the previous century had been found almost throughout Poland. In the 1950s it still constituted 22% of the whole cattle population in Poland. Indeed in 1954 the Polish Red cattle population amounted to over 1.5 million head. Currently, Polish Red cattle are in danger of extinction. Only 300 cows are included in the Program of Genetic Resources Conservation and scarcely several hundred embryos and semen doses are stored in the Semen Bank of the National Research Institute of Animal Production in Balice.

In 2001 the number of recorded Polish Red milking cows was 1,201. Their average performance amounted to 3,786 kg of milk with 4.26% of fat and 3.39% of protein. However, milk yield of the cows at the best farms exceeded 5,500 kg.

Resumen

El objetivo de este estudio es la caracterización de la raza bovina Polish Red, única raza bovina nativa en Polonia. Se describe el origen y la conformación de esta raza así como su desarrollo histórico, distribución y rendimiento. Además, el estudio se centró en la mejora del rendimiento en leche de la raza a través del cruce con las razas Jersey, Danish Red y Angler, y del rendimiento en carne con los cruces con toros de carne de las razas Black-and-White, Red-and-White, Simmental.

Hasta la Segunda Guerra Mundial, la raza Polish Red se encontraba a los mismos niveles de las demás razas internacionales y desde mediados del siglo pasado se podía encontrar en casi todo el territorio de Polonia. Hacia los años 1950 representaba el 22% de la población total de bovinos en Polonia. De hecho, en 1954 la población total ascendía a más de 1,5 millones de cabezas. Actualmente la raza se encuentra en peligro de extinción. Sólo 300 animales están incluidos en el programa de conservación de recursos genéticos y a penas algunos centenares de embriones y dosis de semen están conservados en el Banco de Semen del Instituto Nacional de Investigación de Producción Animal de Balice.

En el 2001 el número de animales en control de esta raza era de 1,201. Su media de rendimiento ascendía a 3,786 kg de leche con 4,26% de grasa y 3,39% de proteína. Sin embargo, el rendimiento en leche de las vacas en las mejores explotaciones superaba los 5,500 kg.
Keywords: Polish Red cattle, Breeding, Conservation, Characteristics, Production performances.

Introduction

Of all the Polish breeds of cattle, only Polish Red cattle, named so by F. Holdeleiss (1897) [acc. to Szumowski (1936)] and L. Adametz (1901): “Das Polnische Rotvieh”, had international significance and were acknowledged as the only indigenous breed raised in Poland. The breed’s international importance was due to the fact that prior to 1939 it constituted 25% of the Polish cattle population, represented one of the oldest pedigree breeding programs in Europe, established in the 1880s, and was exported from Poland to Europe and South America. Other indigenous Polish breeds (e.g. Zulawki and White-backed) were of little economic importance in Polish history (Konopinski, 1949).

The outline of Polish Red (PR) cattle breeding history confirms the great importance of this breed in Poland in the past (Table 1).

The Origin of Polish Red Cattle

Although the PR cattle population in Poland, as throughout Europe, was not uniform, it shared the autochthonic and brachyceric origin. The original cattle had a uniform red colour (and initially also dark brown and even black) and were short-horned. According to Pajak (1968), PR cattle have been associated with Slavonic tribes from very old times and distinguished themselves with excellent hardiness and adaptation to adverse environmental conditions. Different climatic and soil conditions gave rise to local types of red cattle, although generally this was a dual-purpose breed of the intermediate type (Szumowski, 1936).

Varieties of Polish Red Cattle

Differences in the conformation, colour, performance, growth rate and development of PR cattle observed according to the regions of Poland, served as a basis for distinguishing several varieties of the breed. Historically, the first classification was made by Baranski (1887) [acc. to Szumowski (1936)] who distinguished the varieties; Mountain (Old Polish, Old German), Lowland (Forest, Majdan, Field), Steppe Grey (Hutsul, Podolian) and Mixed (Vistula River and Werchowno). This classification was extended by Adametz (1901) who distinguished additional two varieties of PR cattle in the Malopolska region; original mountain cattle with dark brown (“wild”) colour found in the Central Carpathians (up to 900 m above sea-level) and farmed red cattle, located north of the Carpathians in the Malopolska Upland (250-600 m above sea-level). Pajak (1968), citing after Branski, distinguished Mountain and Lowland cattle, a classification similar to that of Rostafinski (1920), into the Mountain (Malopolska region) and Lowland (from the area of the former Congress Kingdom of Poland) varieties. However, the classification of PR cattle made by Konopinski and Borman (1931) was used in the interwar period and adopted by the then Ministry of Agriculture and breeders. The above authors distinguished four varieties of PR cattle: Submontane, Valley, Silesian and Poznan. Even after the end of World War II, Konopinski (1949) mentioned three varieties of PR cattle: Valley (previously known as Lomza, Podlasie, Bug River, western Mazovian), Upland (Swietokrzyskie, Malopolska and submontane) and Silesian (old Silesian and southern Poznan or Rawicz).

As a result of wars which took place in Polish lands, the intensive exchange of breeding animals between varieties, and the introduction of insemination, PR cattle became gradually uniform throughout
Table 1. History of Polish Red cattle breeding.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1869, 1891</td>
<td>The first PR herds established by in Wójcza, Brańszczyk and Czernichów (near Kraków)</td>
</tr>
<tr>
<td>1893</td>
<td>Creation of the first PR herd in Jodłownik, which became the first PR cattle breeding centre.</td>
</tr>
<tr>
<td>1895</td>
<td>The Union of Polish Red Cattle Breeders was set up by the Kraków Agricultural Society, marking the beginning of systematic breeding work.</td>
</tr>
<tr>
<td>1906</td>
<td>Official evaluation of milk yield was introduced to the Malopolska region.</td>
</tr>
<tr>
<td>1909</td>
<td>Polish Red Cattle Breeders Association was established in Warsaw with a branch in Białystok.</td>
</tr>
<tr>
<td>1913, 1929</td>
<td>Three volumes of cow and bull Herd Books were published by the Polish Red Cattle Breeding Association for the period 1896-1911, 1921-1928.</td>
</tr>
<tr>
<td>1914</td>
<td>Polish Red Cattle Breeding Inspectorate was set up in Poznań.</td>
</tr>
<tr>
<td>1929</td>
<td>Silesian Red Cattle Breeders Union was set up.</td>
</tr>
<tr>
<td>1929</td>
<td>At the National Animal Exhibition in Poznań, PR cattle farm from Malopolska won the Grand Prix, a number of state awards of the first degree and other awards.</td>
</tr>
<tr>
<td>1934</td>
<td>At the Malopolska Jubilee Animal Show in Lvov, 550 PR animals from 155 breeders were exhibited to mark 50 years of systematic pedigree breeding. They were awarded 440 distinctions, including 248 state awards and three congratulatory diplomas from the Minister of Agriculture. The bull Juras III (G.10 Lw./11870), representing the main male line in Malopolska breeding, raised by Stanisław Słonecki from Jurowce, won the championship title.</td>
</tr>
<tr>
<td>1937</td>
<td>PR cattle were exported to Brazil and Argentina (16-18 animals were sent from the area of the Cracow Association).</td>
</tr>
<tr>
<td>27. August 1955</td>
<td>Decree of the Ministry of Agriculture to establish 7 PR cattle breeding centres in Podhale, Beskidy, Mazovia, Rawicz, Lublin, Cieszyn, Lubliniec, and the Świętokrzyski regions (created at the request of breeders).</td>
</tr>
<tr>
<td>20. December 1973</td>
<td>Decree of the Minister of Agriculture to confine the regions of PR cattle breeding to the provinces of Katowice (Bielsko and Cieszyn districts), Kraków (Nowy Targ, Nowy Sącz and Limanowa districts), and Rzeszów (Kolbuszowa district).</td>
</tr>
<tr>
<td>1975</td>
<td>Station estimation of PR bull breeding value was introduced due to a gradual decline of the PR cattle population; A conservation breeding region was created for 55 000 PR cows in the Nowy Sącz province (district of Nowy Targ and commune of Jodłownik) – subsidies equivalent to 1000 kg of milk per cow per year, free insemination and performance testing were offered to breeders.</td>
</tr>
</tbody>
</table>

(To be continued ...)

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<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>The Malopolska Cattle Breeders Association was established in Kraków. Among others, it exported 6 groups of in-calf PR heifers to Germany as the so-called ecological cows.</td>
</tr>
<tr>
<td>1997</td>
<td>Advisory Group on Genetic Resources of Farm Animals was set up at the Central Animal Breeding Station in Warsaw – a Working Group on Cattle Genetic Resources was established as its part.</td>
</tr>
<tr>
<td>1999</td>
<td>National Breeding Program for Genetic Resources of Farm Animals and the Polish Red Cattle preservation project were developed. In the year 2000, the Minister of Agriculture and Rural Development approved them for implementation.</td>
</tr>
<tr>
<td>2001</td>
<td>Growing interest in PR cattle in the Białystok province (by 2003, it is planned to buy from the herd in Popielno 100 cows as part of a program implemented by the North Podlasie Bird Protection Society within the framework of the project “Restitution of Polish Red Cattle in the Upper Narew River Valley”).</td>
</tr>
</tbody>
</table>

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Poland (Figure 1). By the 1970s, the division of PR cattle into varieties was no longer relevant.

The Prevalence of Polish Red Cattle

From the 18th century to the period between the wars, PR cattle were found in almost every part of Poland, but their early breeding was marked by the occurrence of motley colours. Initially, PR cattle were bred mainly by peasants and farmers, while in manors preference was given to imported breeds (Simmentals, Dutch cattle, etc). It is important to note that the 19th century studies on native cattle were initiated by foreigners: Holdefleiss, Wilckens and Adametz (Konopinski, 1949).

After World War II, the Submontane variety of PR cattle was found in the provinces of Kraków, Rzeszów and Kielce, the Silesian variety in the provinces of Katowice and Poznan, and the Valley variety in the Łódź, Białystok, Lublin and Warsaw provinces (Felenczak, 1997). In 1954 the population of PR cattle stood at 2,103,419 animals (1,552,320 cows), which constituted 22% of the cattle stock in Poland (Pajak, 1968). The distribution of PR cattle in Poland was uneven – 50% of the population was concentrated in the Kraków province (with about 90% of the population in the districts of Limanowa and Bochnia and about 80% of the cattle population in the districts of Biała, Myslenice and Zywiec). Of this relatively large stock of cattle, just over 13,000 milking cows were recorded. Although in 1955 the active population of PR cattle was 22,000 cows, this constituted just about 1% of all PR cows. In addition, pedigree books of PR cattle contained only a small number of animals – about 2,400 bulls and over 10,000 cows.

Until now, this 1% of recorded cows has been maintained with a rapid decline in the population of PR cattle. This was and is one of the main hindrances limiting the efficient breeding work with the PR breed. The population of PR cattle in Poland peaked in the 1950s but was increasingly replaced by Black-and-White Lowland and Red-and-White Lowland breeds in the years...
that followed. In the end, as a result of another regionalisation of cattle breeding, the Ministry of Agriculture limited the occurrence of PR cattle to the region of Nowy Sacz, where a conservation breeding centre was established in 1975 to maintain a pure PR cattle breeding program. It was planned to gather a population of 55,000 cows mainly in the area of the Nowy Targ district and commune to make breeding work possible. However, the area of Nowy Targ had no tradition of breeding and it was doubtful whether the advantageous attributes of PR cattle would be retained. When in 1982 the Minister of Agriculture resolved to abandon cattle regionalisation in Poland, the breeding of PR cattle was limited to four farms at the Experimental Station Baranowo, at the State Pedigree Breeding Centre Elk, in Hanczowa and Popielno. The purpose was to retain a reserve of genes that represented the valuable traits of PR cattle. Finally, however, the population of PR cattle, which forms about 1% of the national cattle stock, was first crossed with Red Danish and later with Angler breeds. To protect the breed from complete extinction, a breeding program was developed as part of the National Program for the Conservation of Genetic Resources of Farm Animals to recreate and preserve the population of old PR cattle (first 300 animals with a target number of 750 cows). The majority of these animals are found in the area of the Kraków Inspectorate (over 210 cows), followed by the Olsztyn Inspectorate (60 cows, farm of the Polish Academy of Sciences Station in Popielno) and the Bialystok Inspectorate (24 cows) (Program hodowlany zasobów genetycznych bydla polskiego czerwonego, 2000). The authors of the program estimate the size of the purebred PR cattle population to be about 1,000 cows, of which 150 cows are bred in performance tested conservation herds. In mid-2002, 42 farms took part in the breeding program protecting the genetic resources of PR cattle, the largest belonging to the Cistercian Fathers in Szczyrzyc (30 cows) (Kowol, 2002).
Characteristics of Polish Red Cattle

PR animals are characterized by high degree of viability and excellent adaptation to harsh living conditions probably as a result of the poverty of peasant families who kept them over centuries and the areas of their occurrence (the region of south Poland). PR cattle are characterized by resistance to disease (particularly tuberculosis), excellent fertility and longevity. Another major advantage of the breed has been its consistent ability to use farm-produced fodders efficiently (this particularly concerns bulky feeds in winter and pasture grass in summer). This, however, has for many years been misinterpreted as a sign that PR cattle do not require intensive feeding (Pajak, 1968). It is the authors’ opinion that this was one of the reasons why PR cattle breeding ended in a failure.

In addition to the above characteristics, the PR breed is distinguished by unique conformation, which in the case of the Submontane variety (the most numerous at present) has not changed much over 70 years, as evidenced by the data in Table 2.

During the interwar period, PR cattle were considered a medium-sized breed. Younger cows were most often characterised by a small frame size, while older, well fed animals reached larger sizes. The characteristic sexual dimorphism was easily noticeable – bulls were stocky with aurochs-like conformation, while cows had roe deer-like conformation with a delicately shaped head, neck and legs. The trunk was cylindrical and narrow, the front of cows fairly deep, rump usually roof-shaped, base of the tail high. The udder was small and round with vulval suspension. Unlike cows, bulls were characterized by much greater frame size, the front trunk being better built than the rump area, as well as a wider and heavier head. Conformation of PR cattle was highly harmonious, the body weight averaging 450-500 kg for adult cows and 700-900 kg for bulls. Birth weights were 25-35 kg for heifers and 28-45 kg for bulls. Year-old heifers reached a weight of 280 kg, which is 20 kg less than bulls of the same age. PR cattle were an early maturing breed, mainly bred for meat and milk. The average milk yield of cows was 3 000-3 500 kg milk which contained 4.0-4.5% fat (Twardzicki, 1937).

The current Breeding Program specifies the following characteristics of the PR cattle standard:
• coat colour ranging from red to dark red, dark nostrils and hooves;
• conformation traits: strong legs, hard and strong hooves, properly formed udder;
• height at sacrum of adult animals: bulls 140 cm, cows 130 cm;
• utility type: meat-and-milk;
• milk yield per cow averaging 3 200 kg per lactation, fat content of milk 4.2-4.5%, protein content 3.3-3.6%.

As can be seen from the above, the current standard adopted for the recreation of PR cattle in Poland is similar to the characteristics of this breed in the interwar period (1919-1939). It is worth noting that in

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Konopiński and Bormann (1931)</th>
<th>Feleńczak (1997)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height at withers (cm)</td>
<td>123</td>
<td>124</td>
</tr>
<tr>
<td>Chest depth (cm)</td>
<td>64</td>
<td>67</td>
</tr>
<tr>
<td>Pelvic width (cm)</td>
<td>43</td>
<td>46</td>
</tr>
</tbody>
</table>
the meantime the breed standard was formulated several times (in the 1950s by Szostakowski (1959) and in the 1990s by “Program hodowli bydła i produkcji bydlecej do roku 2000” (1996).

Milk performance

Officially controlled recording of the milk yield of PR cattle was first introduced in the area of the Malopolska Association of Polish Red Cattle Breeders (MZHBCP) in 1906, but results of milk testing on superior farms were given by Szumowski (1936) for the year 1895. For example, in the Przyborów farm in 1896 the mean yield of PR cows was 1 400 kg of milk with 4.80% fat, while in 1928 the cows produced 2 552 kg of milk with 3.85% fat. The same author provides data on the milk performance of PR cows in 1902-1933 grouped into individual Associations of Polish Red Cattle Breeders in Poland, with the earliest data given for 1902 for the Malopolska Association. In that year cows produced an average of 1 884 kg of milk with 4.40% fat, while in 1933 their milk yield achieved as much as 2 516 kg with a fat content of 3.94%. The highest milk yield of cows was noted by Szumowski for the Poznan Association (where in 1929 PR cows produced an average of 3 423 kg of milk containing 3.83% fat).

In 1960-1965, controlled milk performance recording involved the greatest number of PR cows (23 000-24 000, including over 10 000 cows registered in pedigree herd books).

Analysis of the results of controlled milk recording over decades shows a very slow increase in the milk yield and in the fat content of milk. Until 1985 cows produced an average of 3 000 kg of milk containing about 4.0% fat. During the following decades (probably as a result of crossing PR cattle with Anglers and improved feeding) the milk yield was shown to increase considerably to 3 663 kg with 4.36% fat content and high protein content of 3.42%. Unfortunately, the improvement of milk performance traits was accompanied by a decrease in the number of tested PR cows to about 1 000 animals.

It should be noted that despite their low milk yield, an important advantage of PR cattle is the favourable composition of milk which makes it particularly suitable for cheese-making purposes – this milk gives a higher yield of casein clot of better quality (especially a high proportion of kappa-casein B) in relation to the Black-and-White and Red-and-White breeds (Leonhard-Kluz, 1976; Szarek et al., 1980a; Felenczak, 1997).

Without doubt, the advantages of PR cows’ milk did not compensate for the relatively low milk yield, which in cows reared on individual farms in the former Nowy Sacz province was due to poor nutrition (Felenczak et al., 1990). While further attempts were made to enhance PR cattle by crossing, not enough efforts were made to improve the conditions in which cattle were bred, especially the rationalisation of cow and heifer nutrition.

Tables 2 and 3 illustrate selected traits of milk performance of Polish Red cows under milk recording in 2001. The number of milk recorded cows was 1201. Their average performance amounted to 3 786 kg of milk with 4.26% of fat and 3.39% of protein (Table 4). However, the milk yield of cows at the best farms exceeded 5 500 kg (milk performance of the best cow called Malina with regard to fat and protein yield was the following: milk yield: 6 924 kg, fat content: 4.68%, protein content: 3.36%, during 6th 305-days lactation).

Polish Red cattle breeding

Studies carried out at the National Research Institute of Animal Production in Balice demonstrated that in terms of suitability for fattening and slaughter, the PR breed is the worst of the four breeds found in Poland (Romer, 1973). However, according to Bujwid (1971), the meat of PR cattle is characterised by high degree of tenderness, delicateness, marbling and water holding capacity, parameters that are very important from the point of view of meat processing. The results were confirmed also by Szarek et al. (1980a). In addition, the studies of Szarek et al. (1980c) showed that as well as good conversion of bulky feeds by PR fattening cattle, they are also characterised by high slaughter yield and their carcasses by favourable tissue composition.

These favourable meat characteristics of the PR cattle did not compensate for lower weight gains during intensive fattening and the resulting higher intake of feed per 1 kg weight gain compared to other breeds of cattle in Poland. Although better results were noted with semi-intensive and extensive fattening of PR cattle (mean daily weight gains of 750-900 g, slaughter yield 55-60% (Juszczak and Zalewski, 1986), this must have been associated with the earlier termination of fattening (at about 360 kg of body weight), while lowland breeds could be fattened to 450-600 kg without the risk of excessive carcass fatness. Under these circumstances, Italian traders did not want to buy PR slaughter cattle, while the then classification of slaughter animals retained Class I only for fattening cattle with a weight exceeding 450 kg.


<table>
<thead>
<tr>
<th>Cows</th>
<th>No. of cows</th>
<th>Milk yield (kg)</th>
<th>Fat (kg)</th>
<th>Protein (kg)</th>
<th>(%)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1201</td>
<td>3786</td>
<td>161</td>
<td>128</td>
<td>4.26</td>
<td>3.39</td>
</tr>
<tr>
<td>Registered in the herd-books</td>
<td>311</td>
<td>3755</td>
<td>163</td>
<td>126</td>
<td>4.34</td>
<td>3.35</td>
</tr>
<tr>
<td>Not registered in the herd-books</td>
<td>651</td>
<td>3675</td>
<td>153</td>
<td>122</td>
<td>4.16</td>
<td>3.31</td>
</tr>
<tr>
<td>Cow heifers</td>
<td>239</td>
<td>3177</td>
<td>134</td>
<td>105</td>
<td>4.22</td>
<td>3.30</td>
</tr>
</tbody>
</table>

194.6% of the cows are kept in private farms; 5.4% – in state farms


Table 4. The yield obtained in the best cow sheds for Polish Red cows in 2001.

<table>
<thead>
<tr>
<th>Breeders</th>
<th>Average no. of cows</th>
<th>Average calving interval (days)</th>
<th>Milk yield (kg)</th>
<th>Fat (kg)</th>
<th>Protein (kg)</th>
<th>(%)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wojciech Zdebski, Kobylec ¹</td>
<td>4.5</td>
<td>463</td>
<td>5664</td>
<td>275</td>
<td>186</td>
<td>4.85</td>
<td>3.29</td>
</tr>
<tr>
<td>Mariusz Sotola, Kobylec ¹</td>
<td>3.2</td>
<td>362</td>
<td>5557</td>
<td>265</td>
<td>192</td>
<td>4.77</td>
<td>3.46</td>
</tr>
<tr>
<td>Sbreihzz Pan w Polpielnie ²</td>
<td>56.1</td>
<td>382</td>
<td>3398</td>
<td>146</td>
<td>113</td>
<td>4.30</td>
<td>3.33</td>
</tr>
<tr>
<td>Klasztor oo. Cystersów, Szczyrzyc ²</td>
<td>55.4</td>
<td>415</td>
<td>3046</td>
<td>123</td>
<td>102</td>
<td>4.04</td>
<td>3.35</td>
</tr>
</tbody>
</table>

¹Among breeders kept not more than 20 cows, ²Among breeders kept more than 20 cows


Beef performance

Studies carried out at the National Research Institute of Animal Production in Balice demonstrated that in terms of suitability for fattening and slaughter, the PR breed is the worst of the four breeds found in Poland (Romer, 1973). However, according to Bujwid (1971), the meat of PR cattle is characterised by high degree of tenderness, delicateness, marbling and water holding capacity, parameters that are very important from the point of view of meat processing. The results were confirmed also by Szarek et al. (1980a). In addition, the studies of Szarek et al. (1980c) showed that as well as good conversion of bulky feeds by PR fattening cattle, they are also characterised by high slaughter yield and their carcasses by favourable tissue composition.
In order to improve the efficiency of fattening PR cattle, commercial crossing with beef breeds and other breeds raised in Poland was applied.

**Improvement of Polish Red cattle**

According to Adametz, quoted after Szumowski (1936), Polish Red cattle were an intermediate breed (between primitive and refined breed) and remained so despite the 120 years of breeding work. The results of these efforts were often wasted by the results of wars (World War I and II, the Bolshevik War), by changes in the political system (1989) and by poor breeding decisions (unimproved environmental conditions, inadequate choice of breed components for improvement crossing, etc.). During 1884-1934, the PR breed was not only established but also improved to the extent that it could rival other breeds of cattle (e.g. Black-and-White or Simmental), and in some regions of Poland, PR cattle supplanted other breeds almost completely (e.g. in the Kraków region). This resulted from professional breeding work and the love of breeders for PR cattle. That period was marked specifically by patriotism and aspirations to create a native breed of cattle. It is worth mentioning that the PR breed was used to advantage during the Versailles Congress (28 June 1919) to encourage the US President Wilson to support Poland’s aspirations for national independence. Himself a devoted breeder, Wilson was shown an album of PR cattle as one of important arguments in favour of establishing independent Poland (Bujwid, 1971). Another fact worthy of note was the export of PR cattle to Germany (more specifically to the Institute of Plant Science in Wroclaw and Bavaria), to Czechoslovakia, Greece, Romania and, most spectacularly to Brazil (state of Parana) (Twardzicki, 1937).

In 1934-1984 breeding work on PR cattle was carried out by 11 PR Breeders Associations in different regions of Poland. This activity involved 400 farms owned by large farmers and 15 000-20 000 cattle licensed in farms owned by small farmers. During that time, purebred breeding for superior male lines [e.g. the lines Topór Rzezbiony (Figure 2), Starosta, Juras III] and family selection (Szumowski, 1936) were applied.

Regrettably, this period was also characterised by “breeding formalism”, a sort of emphasis on conformation traits and colour of hair coat more than performance characteristics. PR cattle, as a less demanding breed, were allocated to areas with poor soils where extensive farming was carried out. Furthermore, when evaluating and selecting animals, too much emphasis was placed on the conformation and coat colour while neglecting milk and beef performance which, as was commonly believed during that time, were specific to the breed and did not require any improvement. As a result, milk performance has remained unchanged for 70 years (Juszczak and Zalewski, 1986).

PR cattle breeding suffered huge losses during World War II but only because of war damage. During that time, an extreme form of “breeding formalism” was employed by the Nazi occupiers. All cows that were not 100% single-colour were delivered to the army. Even a small bright spot near the udder or legs disqualified the cow, and it was usually the case that such animals had generally superior milk performance.

Another important cause of losses suffered by PR cattle breeding in Poland was mishandling of breeding records and selling of breeding bulls of false origin from Malopolska to other regions of Poland. These dishonest practices were revealed in the Kraków province when Prof. J. Rapacz began to test the pedigree of cattle based on blood typing (Piestrak, 1961). It became apparent that out of 10 000 calves born from cows registered in herd books, there were as many as 8 000 bulls and only 2 000 heifers.
The present authors heard of a case where 9 breeding bulls from a superior PR cow were sold over a period of just 1 year! This was during the period when no embryo transplantation or multiple ovulation procedures were used. There was astonishment when daughters of the bull Elwir – regarded as the preferred representative of the breed – showed an average milk yield of just 1 500 kg at the Bull Testing Station of the Institute of Genetics and Animal Breeding of the Polish Academy of Sciences in Jastrzebiec (Jasiorowski et al., 1988).

These obvious errors resulted in breeding progress failing to reflect breeders’ efforts and as a consequence, PR cattle lost out to lowland breeds in Poland. This also gave credence to the arguments of breeders who favoured the improvement of PR cattle by crossbreeding. At this point it should be noted that advocates of both concepts (pure breeding and crossbreeding) have since the beginning of PR cattle breeding argued over the final direction of improvement of these animals.

After World War II, due to the large-scale fragmentation of PR cattle farms, breeding work was carried out in 8 Polish Red Cattle Breeding Centres (Podhale, Beskidy, Swietokrzyski – with the Submontane variety; Mazowsze and Lublin – with the Valley variety; Cieszyn and Lubliniec – with the Silesian variety and in Rawicz with the Rawicz variety) (Pajak, 1968).

In the 1950s, the desired type of PR cow had the following parameters: beef-milk type, body weight 500 kg, annual yield of 3 500-4 000 kg milk containing 4.0% fat, strong constitution, good resistance to...
disease and longevity (Szostakowski, 1959). According to these authors, the above breed standard was achievable by improving breeding conditions (mainly nutrition), selection and adequate choice of the bulls for mating.

However, the beliefs of breeders favouring PR cattle crossing predominated despite the fact that Prof. Konopinski warned in his handbook, as early as 1949, that “neither Red Friesians (...) nor even Red Danish, despite their obvious advantages, are suitable for crossing with Polish Red cattle.”

Similar views were later held by Glus (1987) who stated that the Angler breed should not be crossed with PR cattle either, because neither Red Danish nor Angler cattle are suitable for breeding in Polish conditions, for they originated from seaside areas with milder climate that abounded in feeds. Moreover, both breeds were used only for milk production. The same disadvantages concerned Jersey cattle, which were experimentally crossed with PR cattle in the 1960s in state farms in the Warsaw province and in the area of the Siemiatycz district. It was easy to predict that this would produce animals with superior parameters of milk performance (milk yield and composition, udder conformation) but poorer beef performance (weight of calves at birth, rate of daily weight gains, musculature and slaughter yield). During the inter-war period and just after World War II, Prof. Marchlewski carried out experiments into the crossing of PR and Jersey cattle, stating conclusively that such crossbreeding fails to give positive results because breeders prefer dual-purpose cows. Attempts were made to improve beef performance by crossing with Belgian Red cattle. However, this project has never left the experimental stage (Jasiorowski et al., 1988).

In 1976 efforts were begun to improve PR cattle by crossing with Angler cattle (Felenczak, 1997). This was a success in terms of milk performance as the animals were kept in superior environmental conditions. However, no improvements in frame size or musculature were obtained.

Also in the 1970s the replacement of PR cattle with lowland breeds (Black-and-White Lowland and Red-and-White Lowland) and replacement crossing with the Red-and-White Lowland breed were initiated. PR cattle were crossed with Red-and-White cattle in western and eastern Malopolska and in the district of Lubliniec, thanks to which both dairy and beef traits were improved in the crossbreds. Also, heterosis for milk performance was achieved (Romer et al., 1976; Szarek et al., 1980a, 1981).

On a smaller scale and quite unintentionally, mainly in border areas, PR cows were crossed with Black-and-White Lowland bulls. Although no studies were carried out in this respect, observations have shown that the crosses (PR x BWL) had very good milk traits but poor musculature.

It should also be mentioned that attempts were made to cross PR cattle with Pinzgauers, but this practice was not very common.

Commercial crossing of PR cattle involved both the breeds found in Poland (Black-and-White Lowland, Red-and-White Lowland, Simmental) and those imported from England, France and Italy. At the experimental station in Okocim, suitability for fattening and slaughter merit of PR bulls and their crosses with BWL, RWL, Simmental and Charolais were evaluated by feeding farm-produced fodders to the final weight of about 480 kg. The best parameters of beef performance were characteristic of PR x Simmental, although in the other cases crossbreds were superior to PR bulls.

However, the export of young slaughter cattle to Italy made it necessary to intensify fattening. For this reason, intensive experimental fattening and slaughtering of PR bulls and heifers crossed with Charolais, Piemontese, Limousin, Blonde d’Aquitaine breeds was carried out at the Experimental Station of the National Research Institute of Animal Production in Rymanów (Choroszy, 1987; Choroszy, 1987). It was found that the meat of PR x Charolais crosses had the best quality, while PR x Simmental fattening bulls had the highest mean daily weight gains.
Crosses derived from Piemontese and Blonde d’Aquitaine bulls were the best muscled and had the highest slaughter value. Also these studies confirmed the fact that the crossbreds are generally superior to PR bulls in terms of beef traits.

The extent of crossing PR cattle with other breeds has varied, but it often led to PR cattle being completely ousted from particular farms and regions of Poland. For example, Danish Red bulls and heifers were imported to the extent that in many State Pedigree Breeding Centres they completely replaced PR cattle (Szarek et al., 1993). What is more, the efforts to improve milk performance traits through imported animals were associated with the introduction of leukemia, which had so far been non-existent in Poland (Dymnicki, 1974). It is also worth noting that in order to strengthen the constitution of the Danish Red breed, Danish breeders improved it with the Brown Swiss breed on a national scale. It is no wonder, then, that no Danish Reds are found in the results of performance tests published in recent years (KCHZ, 2001). These cows were observed to have decreased milk yields, weakened constitution, greater susceptibility to disease, poorer growth and development of young stock, and decreased fertility. According to Kaczmarek et al. (1963) the main reasons for health-related culling of PR x DR and DR cows were tuberculosis (37.5% of the cases), low milk yield (15.3% of the cases) and barrenness (13.9% of the cases). The only sign of crossing PR cattle with Danish Reds (DR) is the contribution of DR cattle to the genetic structure of PR cattle. Pedigree analysis of cows from the Animal Breeding Centre in Jodlownik has shown that their genotypes comprise 49% PR, 23% DR and 28% Angler (Kuczaj, 1998).

It should also be mentioned that attempts have recently been made at the Kraków Centre to improve PR cattle with the Swiss breed with promising results (Mazur et al., 1998).

A synthesis of almost all works (for the period 1946-1997) on the crossing of PR cattle with other breeds can be found in a monograph by Kuczaj (2001). In summing up the attempts to improve PR cattle with dairy breeds (Danish Red, Angler, Jersey) as well as Black-and-White Lowland and Simmental, he found that the results obtained under experimental conditions were better than in commercial conditions. The same authors also asserted that Red-and-White Lowlands (RWL) proved the best option for crossing with PR cattle, but this led to PR animals being ousted by RWL animals from the areas of their traditional breeding.

**Conclusion**

At present the only existing native breed of cattle is threatened with extinction, despite the fact that the Polis Red (PR) in the 1940s the breed was found almost all over Poland and was important internationally.

Unfortunately, mistakes in breeding policy have wasted the opportunity to use the breed to advantage. The current stock of PR cattle is tragically small: there are only about 300 cows involved in the “purebred” genetic resources conservation program and several hundred embryos and semen in the semen bank of the National Research Institute of Animal Production in Balice (Program hodowlany zasobów genetycznych bydła polskiego czerwonego, 2000).

The sad history of PR cattle breeding presented in this paper leads to several conclusions. The current situation of PR cattle in Poland is very similar to the situation just after the end of World War I and II. Mr. Lewandowski (1998) wrote in the “Farmer” magazine that Poles have never bred a breed of international importance. To be more precise, they “did but wasted Polish Red cattle”. Breeding is a difficult skill, requiring great knowledge and patience, love of animals and most of all honesty. Although we have often heard recently that we do not need our own pedigree breeding program and it is enough to take advantage of breeding efforts in other countries, it must be stressed that without our own breeding...
program a large number of breeders will be unable to achieve high levels of animal production. The paper’s authors, being emotionally involved in animal breeding (and especially with the breeding of Polish Red cattle) make an appeal, echoing the call of Prof. Zygmunt Moczarski (1917): “Let’s Breed Breeders”.

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