# 3.4 The East Friesian and other European Breeds

A.-H. Farid and M.H. Fahmy
(with contributions by L. Veress (Bergschaf breed) and M. Schneeberger (Swiss Black and Brown sheep))

## Introduction

The sheep described below are mostly dual-purpose breeds found in Europe, with an average prolificacy that ranges from 1.8 to 2.2 lambs. In addition to prolificacy, several of these breeds also excel in lamb and milk production. Some of the breeds are known only locally, whereas others are becoming recognized internationally.

## The East Friesian

### *Origin and development*

The East Friesian (EF) breed, also known as East Friesland, German Milksheep and East Friesian Milksheep developed from the marsh sheep native to the coasts and islands of the North Sea, from the Netherlands to Denmark, particularly in the East Friesland region in northern Germany and the East Friesian Islands (Schwintzer, 1981; Fotsch, 1994). A slightly different type is raised in the Province of Friesland in the Netherlands (Fotsch, 1994).

Ancestors of the EF breed have been kept for centuries, mostly in small flocks, often of only one or two sheep, pasturing with cattle and horses in the marshes, dunes and dikes, supplying milk for individual households. They are described in a few documents preserved in the Vatican Archives; the oldest, 'Descriptis Frisiae', was written by Knight Henricus Ubbius from the Ostermarsch in 1530. He described this breed as one of the 'distinct animal types' for the region, and wrote that 'one must marvel at the East Friesian sheep, which already is taller than other sheep, and throws three to four lambs, sometimes even five' (Schwintzer, 1981). From its place of origin, the breed has spread into Europe as far as Scandinavia and Poland (Fotsch, 1994), and into the high altitudes of the Alps. These sheep are currently concentrated in the Rhineland and Westfalia regions in Germany (Schwintzer, 1981).

### *Description and physical appearance*

The Association of Rhineland Sheep Producers (Germany) has described the German EF Milksheep as 'a growthy, longwooled sheep, white in

colour, with a thin, long woolless tail. The polled, somewhat long head with slightly Roman nose, is free of wool and covered only with fine hairs through which the pink skin is visible. The long, forward pointing ears are thin and appear pink. The solid, long and broad back is firm over the loin, has a good spring of rib and is slightly sloping over the rump. The udder has wide attachment, is quartered and has strong teats which should preferably point downward. The wool is a medium crossbred' (Schwintzer, 1981). In this large-framed breed the head until well beyond the ears, legs, inner thighs and scrotum are devoid of wool (Fotsch, 1994).

## Reproduction

### Sexual maturity

EF ewe lambs (March-born) reach puberty around 7 months of age (Schwintzer, 1981; Ward and Williams, 1993). They continue regular cyclic activity for approximately 5 months, showing an average of 8.8 normal cycles during this period (Ward and Williams, 1993).

### Lambing rate and litter size

After Finnsheep (F) and Romanov (RV), EF is the most prolific sheep breed in Europe (Cumlivski, 1986, 1987; Drozda, 1986). When proper care is provided, lambing rates of 210 to 230% are achievable (Schwintzer, 1981; Berger and Thomas, 1994; Fotsch, 1994). This breed requires good care to express its full reproductive potential, perhaps more so than Romanov and Finnsheep. Lower figures for lambing rate and litter size under experimental and commercial conditions have been reported (Table 3.4.1). The highest lambing rate reported is 32 lambs in 10 years (Schwintzer, 1981).

EF have improved the litter size of local breeds in several countries. Litter size of $F_1$ ewes was higher than that of Polish Corriedale in Poland (1.45 vs. 1.26, Niznikowski *et al.*, 1988a), and Karamaniko Katsikas in Greece (1.48 vs. 1.10, Katsaounis and Zygoyiannis, 1986). Sonmez *et al.*,

**Table 3.4.1.** Lambing rate and litter size of the East Friesian breed.

| Country | Lambing rate (%) | Litter size | References |
|---|---|---|---|
| Czechoslovakia | 124 | 1.34 | Cumlivski (1986)[a] |
| | 160 | 1.70 | Cumlivski (1986)[b] |
| | 106 | | Cumlivski (1987) |
| Ecuador | 160 | | Hernandez (1983) |
| Greece | | 1.73 | Katsaounis and Zygoyiannis (1986) |
| Poland | 195 | | Drozdz (1986) |
| | | 1.49 | Niznikowski (1992) |
| Turkey | 151 | 1.412 | Sonmez *et al.* (1991) |

[a] In large flocks.
[b] In small flocks.

(1991) showed that litter size of the Turkish native Kivircik breed (1.41) was comparable with that of EF $F_1$ crosses (1.48).

### Embryo mortality

In Czechoslovakia, embryo mortality in EF (11.55%) was higher than in F (8.25) and Rv (5.25) breeds (Cumlivski, 1987).

### Lamb mortality

In Czechoslovakia, lamb mortality from birth to 120 days of age was 24.0, 23.5 and 14.5% in EF, F and Rv, respectively, in large flocks (586 to 728 ewes per flock in summer and 290 to 445 ewes per flock in winter). The corresponding figures in small flocks (5 to 20 ewes per flock) were 7.5, 10.1 and 5.8%, respectively (Cumlivski, 1986). These figures may indicate more sensitivity of EF, compared with other prolific breeds, when sufficient care is not provided. In Poland, lamb mortality was 9.1% in Polish Corriedale compared with 17.2% in EF (Niznikowski, 1992). Lamb survival rate in 1/4 EF lambs out of crossbred ewes (98.4%) was higher than those sired by Dorset (93.3%), although more lambs were born in the former group (Berger and Thomas, 1994).

## Production

### Growth rate and body weight

EF lambs are rather heavy at birth, ranging between 4.0 and 5.2 kg in weight (Hernandez, 1983; Peters, 1989; Niznikowski and Rant, 1992b). Average daily gain from birth to 40 kg was 145 g (Niznikowski and Rant, 1992b), and that from birth to 200 days of age was 286 g (Peters, 1989).

EF lambs raised as twins weigh approximately 15 kg at 50 days of age (Zygoyiannis *et al.*, 1990). Ewe lambs weigh 30 kg at 7 months of age (Ward and Williams, 1993), 48 kg at 1 year (Niznikowski and Rant, 1992a) and 63 to 69 kg at 1.5 to 2.5 years of age (Khinkovski and Tsvetanov, 1988). Mature ewes weigh 57 to 75 kg (Schwintzer, 1981; Zygoyiannis *et al.*, 1990; Niznikowski *et al.*, 1992), depending on the stage of production and level of nutrition. Mature rams weigh between 90 and 120 kg (Schwintzer, 1981). A ram from Rhineland had the highest recorded weight of 161 kg (Schwintzer, 1981).

### Carcass traits

In common with other dairy and prolific breeds, EFs have lower subcutaneous fat, higher body cavity fat, and thus leaner carcasses compared with those of meat-type breeds. Dressing percentage of 41.8% and area of rib-eye muscle of 12.1 cm2 were reported for EF male lambs slaughtered at 40 kg liveweight. These figures were comparable with those reported for Polish Corriedale (Niznikowski and Rant, 1992b). Zygoyiannis *et al.* (1990) reported that compared with Greek dairy breeds, the carcasses of EF lambs had a lower back-fat thickness (3.1 vs. 6.8 mm) and their legs contained lower fat (9.9 vs. 16.9%) and higher lean (75.6 vs.

70.5%). Bone, lean and fat in a 13 kg carcass of EF lamb were 22.5, 63.8 and 10.0%. The corresponding figures in 22 kg carcasses were 18.1, 60.7, and 16.6%, respectively. The estimates at 50% mature weight in male lambs were 18.3, 61.4 and 16.1 g $kg^{-1}$, respectively (Zygoyiannis *et al.*, 1990).

**Milk production and composition**

EF is recognized as one of the best dairy breeds in the world. Amount of milk in each lactation is very much influenced by management and nutrition level of the flock. Different estimates for yearly average milk production have been reported; 540–650 kg in Germany (Schwintzer, 1981), 250–350 kg in Sweden (Lindqvist, 1991) and 450 L in the United Kingdom (Mowlem and Treacher, 1987). In Bulgaria, average milk production under experimental conditions was 292 L (Tsvetanov, 1988), 343 L in first lactation and 311 L in second lactation (Tsvetanov, 1988). In Poland, EF produced 375 mL $day^{-1}$ (Niznikowski *et al.*, 1992). Some ewes can produce up to 1498 kg in one lactation (Schwintzer, 1981).

Lactation period ranges between 180 and 210 days (Lindqvist, 1991; Krummenacher, 1992; Fotsch, 1994). Lactation period of some ewes can extend to 260 days, well into their next pregnancy (Mowlem and Treacher, 1987; Fotsch, 1994). In dry areas, milk production is lower and lactation period is shorter than in North European countries. In Greece, for example, EF ewes produced 178 to 183 kg of milk during a 140–170-day lactation period (Katsaounis and Zygoyiannis, 1986).

In Germany, milk fat ranges between 5.5 and 6.0% (Schwintzer, 1981), however, data from other countries indicated lower values. Comparative studies showed that under similar conditions fat content in milk of EF was lower than in other breeds. In Poland, milk fat in EF (4.86%) was 1% lower than in Polish Corriedale (Niznikowski *et al.*, 1992). In another study, fat content of EF milk was the lowest (4.15%) compared with Polish Mountain (5.09%), Finnsheep (5.23%), Polish Hill (6.28%) and Polish Merino (9.25%) (Skolasinski and Charon, 1986). Milk protein percentage ranges between 4.48 and 4.72, which is somewhat lower than in other breeds maintained under similar conditions (Skolasinski and Charon, 1986; Niznikowski *et al.*, 1992). Lactose percentage ranges between 4.56 and 4.79 (Skolasinski and Charon, 1986; Niznikowski *et al.*, 1992), and seems to be more consistent among different experiments and breeds than the other milk constituents.

Udder volume of EF ewes measured during the second month of second lactation was 1843 mL, and milking speed was 8.9 mL $s^{-1}$ (Tenev, 1989).

EF have been used in crossbreeding programmes in many countries to improve milk production and lambing rate of native breeds. Studies were conducted in Poland (Jackowska-Strebler *et al.*, 1985; Niznikowski *et al.*, 1988a, b; Niznikowski, 1992; Niznikowski and Rant, 1992a, b; Niznikowski *et al.*, 1992), Sweden (Lindqvist, 1991) Hungary (Schuszter *et al.*, 1993), the Netherlands (Suss and Strittmatter, 1991), Ukraine (Vlasov and Kitaeva, 1989), Bulgaria (Jorbineva, 1987; Hinkovski and Alexieva, 1989),

Ecuador (Hernandez, 1983), Israel (Nilausen and Lund, 1988), Turkey (Aydogan and Akcapinar, 1987), and Greece (Katsaounis and Zygoyiannis, 1986). In Greece, crossbreeding with EF has improved milk production of native breeds by 25.3 to 67.0% (Katsaounis and Zygoyiannis, 1986).

EF has been used in developing synthetic dam lines and new dairy breeds in several countries. These breeds include Blackheaded Mutton (Nienhoff, 1990; Gut, 1991), synthetic prolific lines 05 and 09 (Gut *et al.*, 1991), Whiteheaded Mutton, Prolific/Wool and Prolific/Meat (Gut, 1991) in Poland; Tahirova (Sarican, 1986; Sonmez *et al.*, 1991), Turkgeldi and Acipayam in Turkey (Sarican, 1986); three Arcott breeds in Canada (Shrestha *et al.*, 1986); Assaf in Israel (Goot, 1986); Cofox in the Netherlands (Suss and Strittmatter, 1991), and also in Bulgaria (Hinkovski and Alexieva, 1989).

### Wool production

EF yearlings produced approximately 3 kg of wool in Poland (Niznikowski and Rant, 1992a). Two-year-old and older ewes produced 3.6 to 6.2 kg of wool in Germany, Poland and Bulgaria (Tsvetanov and Konstantinov, 1988; Niznikowski and Rant, 1992a; Fotsch, 1994), and 3.3 kg in Greece (Katsaounis and Zygoyiannis, 1986).

### Fibre characteristics

EF fleece is classified as crossbred wool. Fleece is graded as spinning count 48's to 52's. Staple length ranges from 11 to 20 cm (Niznikowski and Rant, 1992a; Fotsch, 1994), and fibre diameter averages 40 µm (Peters, 1991).

## *Behaviour*

### Flocking tendency

The EF breed has been kept in small flocks for centuries. Consequently, their herding instinct is not well developed (Fotsch, 1994) and they would not perform well when kept in large flocks or when added to an existing flock of other breeds (Schwintzer, 1981).

### Temperament

As a dairy breed, EF are handled frequently, almost every day, and therefore show less defensive reaction compared with breeds that have less contact with humans (Lankin *et al.*, 1988). Consequently, in contrast to many other breeds, EF sheep can be easily kept individually or in small flocks of only a few sheep. EF sheep are gentle, have a trusting nature, a docile temperament, and form bonds with their keepers (Fotsch, 1994).

## *Adaptation and health*

### Adaptation to different environments

Having evolved in the marshlands of northwestern Europe, and been maintained under harsh conditions of high altitudes of the Alps, the EF

breed is well adapted to the mountain conditions (such as those in Switzerland (Krummenacher, 1992)), and prefers outdoors. Sufficient moisture in the air is required for the breed to show its maximum potential, and thus it is suitable for farming at sea level or in areas with frequent rainfall (Fotsch, 1994). The breed does not perform well in dry and hot regions. Purebred EF sheep performed poorly in Greece, as a result of high temperature and prolonged housing. Other imported breeds (Sardinian, Karakul, Merino, Southdown, Ile-de-France, Suffolk, and Berrichon) acclimatized without serious difficulty (Katsaounis and Zygoyiannis, 1986). $F_1$ ewes (EF × local Kivircik) performed poorly in Turkey (Aydogan and Akcapinar, 1987).

The pink skin of the face and head, which is not protected by wool cover, is easily sunburned when exposed to direct sunshine. In addition to low humidity and direct sunshine in areas such as Greece, Turkey and Israel, lack of adequate nutrition could contribute to the poor performance of this breed in these regions. With its high production potential for milk, lamb and wool, EF sheep do not perform well on sparse feed and unimproved pastures which could be quite adequate for local breeds (Katsaounis and Zygoyiannis, 1986).

### Resistance to diseases and health

Being developed in footrot-prone areas of Europe, EF sheep are more resistant to footrot than breeds that have evolved in arid areas (Shimshony, 1989). Crossbreeding with EF would thus reduce the susceptibility of the latter breeds to footrot.

$F_1$ ewes (EF × local breeds) were particularly susceptible to parasites and to piroplasmosis, to which the local breeds were resistant (Katsaounis and Zygoyiannis, 1986). Mortality among $F_1$ ewes was 63%, largely due to chronic respiratory diseases (Kaysaounis and Zygoyiannis, 1986). Intestinal pneumonia, caused mainly by *Pasteurella haemolytica* and *P. multocida*, resulted in 50% mortality in EF lambs in Israel. Mortality rate was significantly lower in pure Awassi and EF × Awassi crosses kept under the same conditions (Shimshony, 1983).

To increase milk production, the diets of EF ewes are usually supplemented during lactation with high levels of concentrates. This supplementation sometimes cause chronic copper (Cu) poisoning (Lindqvist, 1991), since Ef sheep are moderately susceptible to Cu poisoning (Woolliams *et al.*, 1982).

## Other European Breeds

### *Avranchin*

This open-air breed has resulted from crossing the local French sheep population with the imported British breeds Dishley, Kent and Southdown. The first crossing goes back to 1820, and by 1900 the characteristics

29.2% for quadruplets (Weisheit, 1980). Mortality is higher under accelerated lambing and may reach 28% (Mendel *et al.*, 1989).

Birth weight of lambs averages 3.5 kg, and they gain 259 g between birth and 42 days (Mendel *et al.*, 1989). Ewes and their lambs are managed in one of two ways: they are either left to graze on mountain pastures in large flocks until the lambs are 5–6 months old (34–40 kg liveweight), at which time they are slaughtered; or, they are kept in small flocks in paddocks until weaning at 10 weeks of age (about 25 kg) and then fattened to market weights.

## *Bleu du Maine and Rouge de l'Ouest*

These two French open-air breeds have the same origin, as well as physical and production characteristics. They differ only in colour. The Blue du Maine has a blue head, and the Rouge de l'Ouest has a red head and limbs. Both originate in the region formed by the counties of Maine-et-Loire, Mayenne and Sarthe, in northern France.

Although these breeds were created recently, their exact origin cannot be precisely established. It is believed that sheep breeds imported from Britain in the 19th century contributed to them. One such breed, which can explain the Bleu du Maine colouring, is the Wensleydale. The Bleu du Maine Sheep Breeders' Association was established in 1927, and the breed was recognized in 1948. The Rouge de l'Ouest Sheep Breeders' Association was established in 1968. The population of the two breeds exceeds 85,000 and 70,000 sheep, respectively.

The two breeds are polled, with a wide forehead without wool, and have a slightly aquiline profile. The eye-sockets are prominent and the nose is wide. The long, slim, coloured ears are pricked up and placed high on the head. The body has an average neck, well-muscled shoulders, a wide and deep chest, a straight and regular back, and a long and wide pelvis. The tail-joint is well blended in the croup, with well-developed legs descending on the hocks. The wool is white and homogeneously tight, covering the whole body except the head, hocks and knees. The wool is average in length and fineness. Rams weigh 110–120 kg and ewes, 80–90 kg.

Bleu du Maine and Rouge de l'Ouest sheep are well adapted to breed almost entirely in the open, on rich pastures. Only a few breeders shelter their ewes during the spring lambing season. Bleu du Maine and Rouge de l'Ouest are early maturing; 56 and 67% lamb before 15 months of age and 71 and 84% before 18 months, respectively. Prolificacy is high; only 15.4% of ewes produce singles; 63.8%, twins; 19.3%, triplets; and 1.5%, quadruplets. The average prolificacy is 1.5–1.6 for yearlings and 2.0 for adults 3 years old and older. Prolificacy in well-managed Blue du Maine flocks can reach 2.38. These breeds have a short lambing season that extends from January to April, with the highest concentration occurring in March. They therefore may not be suitable for accelerated breeding systems.

The ewes are good milkers; 90% of twin and 57% of triplet lambs are

raised by their mothers. During a 97-day lactation, Rouge de l'Ouest ewes yielded an average of 102 L, consisting of 6.3% fat and 5.0% protein (Malher, 1991). Male and female lambs gain about 296 and 272 g between 10 and 30 days of age; the figures for twins are 241 and 234 g, respectively. Male lambs between 30 and 70 days of age gain about 300 g $day^{-1}$; females gain 270 g. Lambs on pasture can reach 37 kg by 90 days of age.

The fibre diameter of Bleu de Maine was reported at 36.8 mm, with 9.6% medullation and 8.1% pigmentation (Steinhagen *et al.*, 1986).

Bleu du Maine was exported to Britain, Belgium, Germany, Czechoslovakia and Switzerland. Rouge de l'Ouest was exported to Britain and Belgium.

## Charollais

The Charollais was developed by Benoit D'azy in 1825 in the Nièvre region. It is a cross between Leicester Longwool (commonly called Dishley at that time) and local breeds. For many years Charollais were known as 'les mouton de pays' (sheep of the country). They were named Charollais only in 1963 and were recognized as a distinct breed in 1974. About 380,000 Charollais sheep are raised in France, but only 10,000 are under performance testing on 184 farms. Although Charollais is recognized as a meat-type breed, its high prolificacy and milk production place it in the category of dual-purpose sheep. Charollais sheep, semen and embryos have been exported to Germany, Switzerland, Spain, Portugal, Britain, Canada and China.

Charollais animals are large and heavy, the males weighing 100–150 kg and the females 75–95 kg. The head is clear of wool but sometimes has coloured hair with black tips. The front is large, and the ears are fine, long and mobile. The body is long with a muscular belly, the chest large and deep, and the shoulders blend smoothly into the body. The legs are thick, short, coloured and without wool. The wool is short, consisting of white fine fibres.

Sexual maturity occurs late in Charollais; only 43% of ewes lamb between 12 and 15 months, and 39% lamb between 24 and 36 months. Prolificacy of ewes lambing for the first time varies between 1.37 to 1.72, according to age at lambing. The average for ewes lambing before 18 months of age is 1.41. Prolificacy of adult ewes averages 1.85 and can reach 2.23 in well-run farms. About 60% of all births are twins, 30% singles, and 10% triplets and quadruplets. Between birth and 30 days, single-born male and female lambs gain, on average, 285 and 271 g per $day^{-1}$, and twins gain 230 and 220 g, respectively. From 30 to 70 days of age, daily gain of the four groups (singles, twins, triplets and quadruplets) averages 325, 279, 278 and 274 g; weight at 70 days averages 26.5, 24.9, 22.3 and 21.2 kg, respectively. The Charollais is used intensively in crossbreeding to produce heavy market lambs. Lambs with Charollais ancestry excel in carcass conformation and lean content.

In 1990 a few breeders in the western part of Switzerland started systematically to breed their Swiss White Alpine sheep with Charollais.

They registered the cross as a new breed called Swiss Charollais. The 1991 annual report of the Swiss Sheep Breeders' Association reported that for 199 ewes, age at first lambing averaged 662 days; and litter size at the first three parities averaged 1.8, 1.2 and 1.2 lambs, with almost no lamb mortality up to 30 days of age.

## German Whiteheaded Mutton

German Whiteheaded Mutton originated in northwest Germany in the middle of the 19th century from a cross between Cotswold and Marsh. The new breed may have Texel ancestry. Almost 100,000 German Whiteheaded Mutton sheep were reported in Germany in 1987, which represents 7.8% of all the sheep in that country. The population has been growing steadily since the 1970s (Von Korn *et al.*, 1988).

Jensen (1989) reported the following respective averages for ewes and rams measured at test stations: height at withers, 72 and 80 cm; chest circumference, 114 and 125 cm; body length, 80 and 86 cm.

Ranvig and Peterson (1989) reported the following: stillbirths, 8.7%; lamb mortality from birth to 2 months, 4.6%; and number of lambs weaned per ewe lambing, 1.64; 6.5% of ewes required assistance at lambing, but no case was serious enough to require veterinary intervention.

Maussen *et al.* (1988) reported the following: prolificacy, 1.81 at lambing and 1.66 at weaning; age at first lambing, 566 days; and lambing interval, 359 days.

Peterson (1988) reported the following: number of lambs born alive per ewe lambing, 1.9; average lamb weight at 60, 90 and 120 days, 22.1, 31.5 and 42.7 kg, respectively; daily gain from 60 to 120 days, 343 g $day^{-1}$; feed conversion ratio, 2.57–2.67; eye muscle area, 11.1 $cm^2$; and fat thickness over loin-eye muscle 5.7 mm (Jensen, N.E., 1987; Jensen, P., 1989).

Fredriksen and Hojland-Fredriksen (1987) reported the following: conception rate, 79% for yearlings and 95% for adults; litter size, 1.5 for yearlings and 2.12 for ewes; weight of lambs produced per ewe, 79 kg; unit feed per kilogram of lamb, 8.7.

Steinhagen *et al.* (1986) reported an average fibre thickness of 41.3 μm with 33.6% medullation and 22.6% pigmentation.

## Roussin de la Hague

The Roussin de la Hague breed originated in 1920 in northern France by crossing Dishley and Southdown with local sheep. More recently, in 1960, Suffolk and Avranchin were also included to improve carcass qualities and prolificacy. The breeders' association was formed in 1978, and the breed was officially recognized in 1982. The current population is between 15,000 and 20,000 head concentrated in Brittany and the Sologne region.

This open-air breed is well adapted to the wet and windy climate prevailing in its habitat. Ewes weigh 70–90 kg and rams 90–110 kg. The

animals are polled, with a short head covered with dark brown hair. The face is clear of wool, with a straight profile showing a slight depression at eye level. The ears are of medium size, mobile, and covered with fine short hair. The body is straight and large with open shoulders. The legs are covered with hair similar to that of the head. The body is covered with white wool that is medium in length (5–7 cm).

The breed is early maturing; 83% of ewes lamb for the first time before 15 months and 93% before 18 months. Lambing is concentrated in winter, between January and April. Prolificacy of yearlings and ewes lambing in February and March is about 1.8 and 2.1, respectively. The average prolificacy of the breed is 1.87, reaching 1.96 in the best ten flocks. Ewes are good milkers and can easily raise large litters without difficulty. Single and twin lambs gain 318 and 284 g $day^{-1}$ between 10 and 30 days, and females gain 340 and 266 g, respectively.

## Swiss Black–Brown Mountain Sheep

The Swiss Black Brown Mountain sheep (also called Jura sheep, after the Jura Mountains in northwestern Switzerland) originated from several coloured, local sheep strains that were bred mainly in locally confined areas and responded to special demands. In the late 1930s and early 1940s, the local strains were combined to produce more uniform breeds, and in 1941 the breed got its present name. Today it can be found throughout almost the whole country, with a concentration in western Switzerland. Two colour strains occur, black and brown. Approximately 10,000 animals are registered in the official flock book, with the total population estimated to be about 40,000. As is generally the case in Switzerland, the sheep are bred in small flocks, the average flock consisting of approximately ten ewes.

Rams of this breed have a mature size of 75–82 cm at withers; females measure 66–74 cm. Body weight is 80–120 kg for males and 65–90 kg for females. In accordance with the main breeding purpose, that is, the production of lamb meat, the Black Brown Mountain Sheep have a good conformation and a good carcass value.

The wool is black or brown; a few grey or white fibres may be found in the fleece of older animals. Yearly wool yield (greasy) is 3.5–4 kg for males and 3–3.5 kg for females, with a fibre diameter of approximately 25–30 μm. Because sheep are normally shorn twice a year in Switzerland, because of two distinct feeding and managing periods, staple length is short: 4–4.5 cm in 6 months. The head and legs do not carry wool.

A very important characteristic of this sheep is its excellent, non-seasonal reproductive performance. With a lambing interval of 297 days, 2.1 lambs are born on average per ewe per year. The average number of lambs born alive per litter is 1.75, with 62% of the parturitions consisting of multiple births. Lambs are born mainly from autumn through spring, with peaks in October and March. No births occur during the summer because breeders avoid lambing during the alpine pasture period.

Reproductive performance is combined with good growth capacity.

The average birth weight is 4.5 kg for single births and 3.9 kg for multiple births. Single-born male lambs weigh 15.1 kg and females 14.4 kg at 30 days; multiple-born lambs at 30 days weigh an average of 12.6 kg. The average daily gain from birth to 30 days was measured at 367 g $day^{-1}$ from August 1992 to July 1993.

## *Vendéen*

A dual-purpose open-air breed popular for its prolificacy, milking ability, and the quality of its market lambs, Vendéen originated in France in the middle of the 19th century. It is a cross between English Southdown and local sheep in the Bas-Poitou region. The current population of Vendéen consists of more than 300,000 ewes concentrated in two regions. The rams, however, are used intensively in commercial breeding in many other regions and have been exported to Britain for crossbreeding. Unlike their Southdown ancestors, the Vendéen's long legs keep the body high off the ground. Body weight averages 60–70 kg for ewes and 85–110 kg for rams. The animals are white with a grey face, resulting from the complementary actions of a dominant agouti allele and a dominant allele designated Japanese brindling of the *E* locus (Mahler and Denis, 1990). Wool covers the entire the body and extends to the legs. The fleece is dense, with medium fineness and with staples averaging 7 cm long. Rams produce 3.5–4 kg of wool and ewes, 2.5–3 kg.

This breed adapts well to various open-air or semi-open-air management systems, in which animals are kept either outdoors year round except for the lambing period or on pasture for most of summer. Vend(82)en can be maintained extensively on poor pastures, or intensively on fertile land, or intensively in barns. Lambs can be finished to 38–40 kg market weight, reached at 3–5 months of age strictly on forage.

These sheep are maintained on a traditional management of one lambing per year. Only 8% of ewes are managed under an accelerated lambing system, and they have to be treated with hormones to induce out-of-season ovulation.

Sexual maturity is early; 60% of ewes lamb for the first time before 15 months and 82% before 18 months. Vendéen ewes can lamb throughout the year except for June, July and August; 70% of parturitions occur between December and February.

Prolificacy is about 1.6 for primiparous and about 1.8 for multiparous. Prolificacy in the best flocks averages 2.0–2.2 in adult ewes. The animals are long-lived, with ewes maintaining good production up to 10 years of age.

Because of the good milking ability of ewes, they can raise large litters successfully. Growth of twin-born twin-raised lambs averages 220–230 g $day^{-1}$. Growth of males and females between 30 and 70 days averages 277 and 247 g for single-born and 253 and 227 g for twin-born lambs, respectively.

## References


Aydogan, M. and Akcapinar, H. (1987) Fertility and milk yield characteristics of East Friesian × Kivircik sheep in Central Anatolia (in Turkish). *Lalahan Hayvancilik Arastirma Enstitusu Dergisi* 27, 1–4.

Berger, Y.M. and Thomas, D.L. (1994) Survival, growth, and feed efficiency of 1/4 East Friesian lambs. *The Shepherd* 39 (10), 36–37.

Cumlivski, B. (1986) Comparison of reproduction ability of the so called 'world' fertile breeds ofsheep in large and small concentrations. *Proceedings 3rd World Congress on Genetics Applied to Livestock Production*, Lincoln, Nebraska, Vol. IX pp. 575–579.

Cumlivski, B. (1987) Optimal fertility of sheep and prenatal mortality of lambs. *38th Annual Meeting of the European Association for Animal Production*, Lisbon, Portugal, Vol. 1, pp. 228–229.

Drozdz, A. (1986) Factors affecting prolificacy of ewes (in Polish). *Biuletyn Informacyjny, Instytut Zootechniki, Krakow* 24 (4), 39–57.

Fotsch, R. (1994) Portrait of a milking breed. East Friesian milksheep making a big splash in North America. *The Shepherd's Journal* Nov–Dec, 5–6.

Frederiksen, J.H. and Hojland-Frederiksen, J. (1987) Sheep flock traits in 1985–86 (in Danish). *Tidsskrift-for-Fareavl.* 52 (8), 18–21.

Goot, H. (1986) Development of Assaf, a synthetic breed of dairy sheep in Israel. *37th Annual Meeting of the European Association for Animal Production*, Budapest, Hungary. Papers GS2.4 and 1775 E, 29 pp.

Gut, A. (1991) Carcass quality of ram lambs of Polish breeds and of four synthetic lines finished to 35 kg (in Polish). *Prace Komisji Nauk Rolniczych i Komisji Nauk Lesnych* 71, 37–44.

Gut, A., Sliwa, Z. and Slosarz, P. (1991) The performance of ewes from a synthetic prolific line formed using Finnish Landrace inheritance (in Polish). *Prace Komisji Nauk Rolniczych i Komisji Nauk Lesnych* 71, 45–50.

Hernandez, C.E. (1983) A study of some production and reproductive parameters in four imported breeds compared with the performance of housed Criollo ewes (in Spanish). *Memorias, Asociacion Latinoamericana de Produccion Animal* 18, 137–138 (Abstract).

Hinkovski, T. and Alexieva, S. (1989) Sheep breeding and local sheep breeds in Bulgaria. In: Erskine, K. (ed.) *Colored Sheep and Wool: Exploring their Beauty and Function.* Black Sheep Press, Oregon, pp. 112–114.

Jackowska-Strebler, H., Ciurus, J. and Gajda, D. (1985) The performance of crossbred $F_1$ ewes of the Polish Mountain breed with east Friesian rams (in Polish). *Roczniki Naukowe Zootechhniki, Monografie i Rozprawy* (23), 133–154.

Jensen, N.E. (1987) Performance testing of ram lambs in 1987 (in Danish). *Tidsskrift-for-Fareavl* 52 (9), 49–55.

Jensen, P. (1989) Report from the breeding and testing centres in 1988 (in Danish). *Tidsskrift-for-Fareavl* 54 (3), 12–23.

Jorbineva, M. (1987) Production and composition of milk of native Stara Zagora sheep and their crossbreds with the East Friesian breed (in Bulgarian). *Zhivotnov'dni Nauki* 24, 28–34.

Katsaounis, N. and Zygoyiannis, D. (1986) The East Friesland sheep in Greece. *Research and Development in Agriculture* 3, 19–30.

Khinkovski, T.S. and Tsvetanov, V. (1988) The effect of non-genetic factors on some quantitative characters of dairy-type sheep. 1. Body weight (in

Bulgarian). *Genetika i Selektsiya* 21 (1), 58–64.

Krummenacher, K. (1992) Is the East Friesian breed about to become the sixth most important breed in Switzerland? (in German). *Kleinviehzuchter* 40, 853–854.

Lankin, W., Stakan, G., Chinkowski, Z., Nedeltschew, D. and Zenkow, I. (1988) Effects of variations in defensive behaviour on milk yield of sheep (in German). *Internationale Zeitschrift der Landwirtschaft* 4, 313–315. *Animal Breeding Abstracts* 58, 6649.

Lindqvist, A. (1991) Dairy sheep, a new production line for Swedish agriculture (in Swedish). *Svensk Veterinartidning* 43 (10), 423–426.

Malher, X. (1991) Milking ability of machine milked Rouge de l'Ouest ewes: first results. In: Eitam, M. (ed.) *Proceedings of the 4th International Symposium on Machine Milking of Small Ruminants*, Kibbutz Shefayin, Israel, pp. 290–299.

Malher, X. and Denis, B. (1990) Inheritance of coloured face and leg in Vendéen sheep (in French). *Recueil de Medecine Veterinaire* 166, 501–504.

Maussen, B., Preisinger, R. and Kalm, E. (1988) Analysis of the fertility situation of the north German sheep population. *Proceedings of the 3rd World Congress on Sheep and Beef Cattle Breeding*, Paris, Vol. 2, pp. 506–508.

Mendel, C., Scholaut, W. and Pirchner, F. (1989) Performance of Merinolandshaf and Bergschaf under an accelerated lambing system. *Livestock Production Science* 21, 131–141.

Mowlem, A. and Treacher, T.T. (1987) Milk production from sheep and goats. *British Society of Animal Production, Programme and Summaries.* Paper No. 7, 2 pp.

Nienhoff, H.J. (1990) Sheep breeding in Poland is struggling forward (in Polish). *Kleinviehzuchter* 38, 33–36.

Nilausen, S. and Lund, A. (1988) Dairy sheep in Israel (in Danish). *Tidsskrift-for-Fareavl* 53 (6), 13–15.

Niznikowski, R. (1992) The effect of crossbreeding of sheep of the Polish Corriedale breed with theEast Friesian milk sheep on chosen commercial characteristics of their progeny. I. Reproductive indices. *Annals of Warsaw Agricultural University SGGW, AR, Animal Science* 27, 37–41.

Niznikowski, R. and Rant, W. (1992a) The effect of crossbreeding of sheep of the Polish Corriedale breed with the East Friesian milk sheep on chosen commercial characteristics of their progeny. III. Body weight and wool performance. *Annals of Warsaw Agricultural University SGGW, AR, Animal Science* 27, 47–50.

Niznikowski, R. and Rant, W. (1992b) The effect of crossbreeding of sheep of the Polish Corriedale breed with the East Friesian milk sheep on chosen commercial characteristics of their progeny. IV. Meat productivity. *Annals of Warsaw Agricultural University SGGW, AR, Animal Science* 27, 51–56.

Niznikowski, R., Tyszka, Z.J. and Janikowski, W. (1988a) Meat, wool and milk utilization together with comparison of F coming from other prolific breeds. *Journal of Agricultural Science in Finland* 60, 534–537.

Niznikowski, R., Tyszka, Z.J., Rudnik, J. and Fetras, D. (1988b) First-lactation milk yield in East Friesian and Polish Corriedale sheep and their crosses (in Polish). *Annals of Warsaw Agricultural University SGGW, AR, Animal Science* 23, 25–31.

Niznikowski, R., Tyszka, Z.J. and Janikowski, W.T. (1992) The effect of crossbreeding of sheep of the Polish Corriedale breed with the East Friesian milk sheep on chosen commercial characteristics of their progeny. II. Milk production (in Polish). *Annals of Warsaw Agricultural University SGGW, AR, Animal Science* 27, 43–46.

Perret, G. (1986) La race mouton Charollais. In: *Races Ovines*. ITOVIC, Paris, pp. 295–302.

Peters, H.U. (1989) Investigations on type of birth, birth weight and growth in East Friesian sheep (in German). *Tierzuchter* 43, 314–317.

Peters, H.U. (1991) Investigations on wool fineness in East Friesian sheep (in German). *Monatshefte fur Veterinarmedizin* 46, 97–100.

Petersen, P.H. (1988) A report on the computerized lamb recording scheme in 1987 (in Danish). *Tidsskrift-for-Fareavl* 53 (3), 24–33.

Ranvig, H. and Petersen, P.H. (1989) Health recording in lambs and ewes in 1988 (in Danish). *Tidsskrift-fur-Fareavl* 54 (3), 60–62.

Ranvig, H. and Petersen, P.H. and Jensen, A.M. (1988) Health registration in lambs and sheep in 1987 (in Danish). *Tidsskrift-for-Fereavl* 53 (7), 5–9.

Rottmann, O., Klupak, K., Willeke, H. and Pirchner, F. (1982) Fertility of Texel and German Mountain sheep and their crossbreds (in German). *Zuchtungskunde* 54, 229–234.

Sarican, C. (1986) Breeding techniques for the genetic improvement of small ruminants in the Ege region. *Giessener Beitrage zur Entwicklungsforschung* 13, 57–64.

Schuszter, T., Kosa, L. and Lengyel, J. (1993) Milk production of purebred and crossbred Lacaune sheep in Hungary. In: Kukovics, S. (ed.) *Proceedings 5th International Symposium Machine Milking of Small Ruminants*, Budapest, Hungary. Asbury Publishing Ltd, Cheltenham, UK, pp. 252–254.

Schwintzer, I. (1981) *Das Milchschaf*. Verlag Eugen, Stuttgart, Germany.

Shimshony, A. (1983) Pneumonia in East Friesian lambs and crosses in Israel. *Revue Scientifique et Technique Office International des Epizooties* 2, 467–471.

Shimshony, A. (1989) Footrot in Awassi and their crosses with East Friesian sheep. *New Zealand Veterinary Journal* 37, 44.

Shrestha, J.N.B., Fortin, A. and Heaney, D.P. (1986) Genetic and phenotypic parameters of carcasstraits in ram lambs reared artificially in a controlled environment. *Canadian Journal of Animal Science* 66, 905–914.

Skolasinski, W. and Charon, K.M. (1986) The composition of milk in some Polish sheep breeds (in Polish). *Biuletyn Informacyjny, Instytut Zootechniki, Krakow* 24 (4), 58–70.

Sonmez, R., Turkmut, L. and Kaymkci, M. (1991) Possibilities for improving the dairy performance of Tahirova sheep (in Turkish). *Doga, Turk Veterinerlik ve Hayvancilik Dergisi* 15, 72–86.

Steinhagen, O., Dreyer, J.H. and Hofmeyr, J.H. (1986) Histological differences in the skin and fibre characteristics of ten white-woolled sheep breeds. *South African Journal of Animal Science* 18 (2), 90–94.

Suss, R. and Strittmatter, K. (1991) Sheep breeding in the Netherlands – impressions from an educational visit (in German). *Tierzuchter* 45, 216–219.

Tenev, S. (1989) Macromorphological conformation of the udder in sheep of different breeds inrelation to milk yield and suitability for machine milking (in Bulgarian). *Zhivotnov'dni Nauki* 26, 96–102.

Tsvetanov, V. (1988) A comparison of the effect of crossbreeding in the formation of dairy sheep. 2. Lactation milk yield (in Bulgarian). *Zhivotnov'dni Nauki* 25 (5), 26–32.

Tsvetanov, V. and Konstantinov, K.V. (1988) The evaluation of hybridization in crossbreeding Pleven Blackheaded and East Friesian sheep. 1. Body weight and fleece weight (in Bulgarian). *Genetika i Selektsiya* 21 (1), 72–77.

Vlasov, A.I. and Kitaeva, A.P. (1989) The use of East Friesian rams in the southern

Ukraine (in Russian). *Zootekhniya* 1989 (6), 28–30.

Von Korn, S., Peters, K.J. and Von Korn, S. (1988) Early maturing and fertile, with outstanding carcass quality. Effect of the Texel on sheep breeding in northern Germany (in German). *Tierzuchter* 40, 18–20.

Ward, S.J. and Williams, H.L. (1993) Ovarian activity and fertility during the first breeding seasonof Friesland ewe lambs. *British Veterinary Journal* 149, 269–275.

Weisheit, H. (1980) Biological investigations of non seasonal German Mountain sheep (in German). *Tierzuchter* 32 (1), 25–28.

Woolliams, J.A., Suttle, N.F., Wiener, G., Field, A.C. and Woolliams, C. (1982) The effect of breed of sire on the accumulation of copper in lambs, with particular reference to copper toxicity. *Animal Production* 35, 299–307.

Zygoyiannis, D., Stamataris, K., Kouimtzis, S. and Doney, J.M. (1990) Carcass composition in lambs of Greek dairy breeds of sheep. *Animal Production* 50, 261–269.