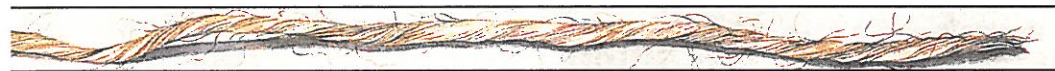


Wool
Grades
and the
Sheep
that
Grow
the Wool



WOOL GRADE

Comparing wool grades

Type of Wool	Old Blood Grade	Standard Specifications		
		USDA Grade	Range for Average Fiber Diameter	Standard Deviation Maximum
Fine	Fine	Finer than 80's	(microns) Under 17.70	(microns) 3.59
Fine	Fine	80's	17.70-19.14	4.09
Fine	Fine	70's	19.15-20.59	4.59
Fine	Fine	64's	20.60-22.04	5.19
Medium	½ Blood	62's	22.05-23.49	5.89
Medium	½ Blood	60's	23.50-24.94	6.49
Medium	¾ Blood	58's	24.95-26.39	7.09
Medium	¾ Blood	56's	26.40-27.84	7.59
Medium	¾ Blood	54's	27.85-29.29	8.19
Medium	¾ Blood	50's	29.30-30.99	8.69
Coarse	Low ¾	48's	31.00-32.69	9.09
Coarse	Low ¾	46's	32.70-34.39	9.59
Coarse	Common	44's	34.40-36.19	10.09
Very Coarse	Braid	40's	36.20-38.09	10.69
Very Coarse	Braid	36's	38.10-40.20	11.19
Very Coarse	Braid	Coarser than 36's	Over 40.20	—

(ASTM) American Society for Testing and Materials Designation D3991

For thousands of years, wool has been spun into coarse or fine yarns—the wool fiber diameter determining whether it would be coarse or fine. However, more than the terms “coarse” or “fine” were needed to describe the difference between wool from the different breeds of sheep, or the wool from the different parts of the same fleece. So, over the years, three grading systems evolved to describe wool for manufacturing and sales. They are the **Blood System**, the **Count System**, and the **Micron System**.

The **Blood System** is the oldest system, originating at the time of the early American colonies. It is based on the bloodline or breeding of the sheep, and is divided into six grades. The Merino or Rambouillet wool is called fine. A half-blood wool comes from sheep that are half Merino or Rambouillet and half another breed. Wool types grown on sheep with fractional

Grades of wool by sheep common in the U.S.

	Delaine-Merino													
	Debouillet													
	Rambouillet													
	Targhee													
	Columbia													
	Corriedale													
	Finnsheep													
	Montadale													
	Dorset													
	Cheviot													
	Southdown													
	Shropshire													
	Hampshire													
	Suffolk													
	Oxford													
	Romney													
	Border Leicester													
	Lincoln													
USDA Grade	80's	70's	64's	62's	60's	58's	56's	54's	50's	48's	46's	44's	40's	36's
Micron Range	17.70-19.14	19.15-20.59	20.60-22.04	22.05-23.49	23.50-24.94	24.95-26.39	26.40-27.84	27.85-29.29	29.30-30.99	31.00-32.69	32.70-34.39	34.40-36.19	36.20-38.09	38.10-40.20

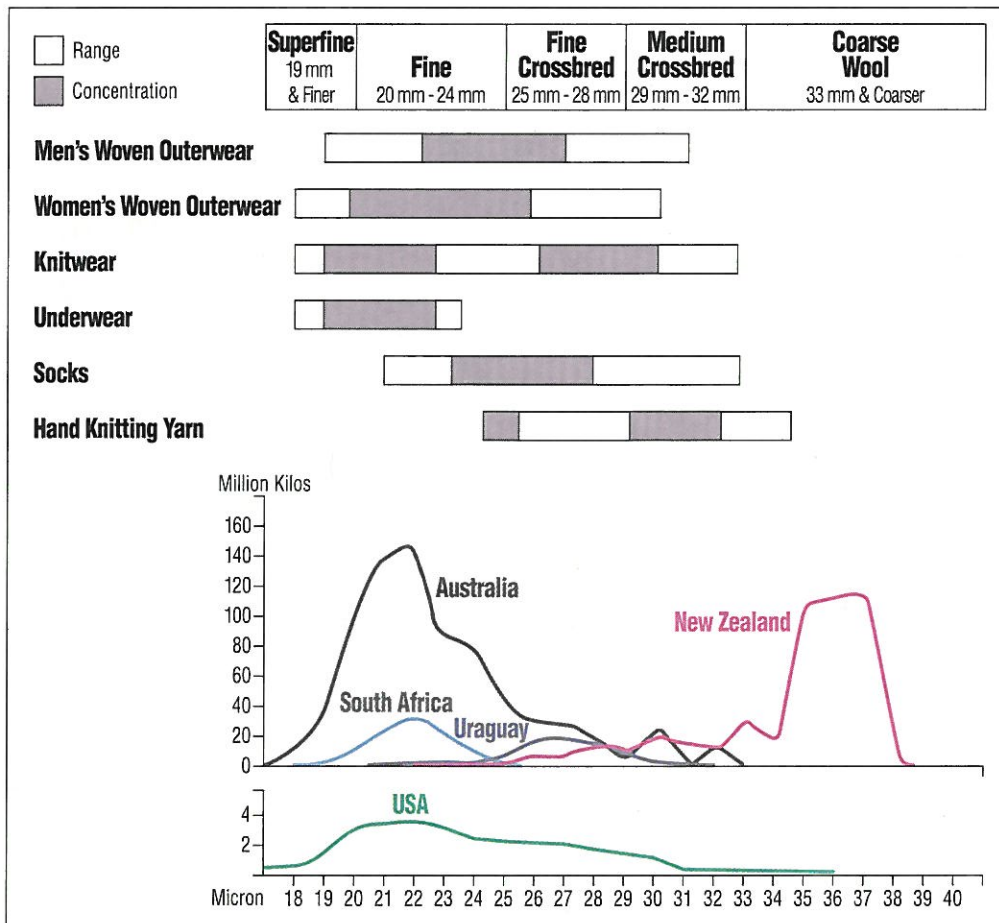
ING SYSTEMS

quantities of Merino or Rambouillet breeding are called ½ blood, ¾'s, ¼, Low ¼, and Common; and generally are coarser wool or wool with a larger fiber thickness. The blood system, however, cannot describe newer sheep breeds or differences in wool from the same animal.

The **Count System** is a more extensive method. The term count refers to the number of "hanks" of yarn that can be spun from one pound of wool top. A hank is 560 yards. The count system divides wool into 14 grades with the count range from 80's to 36's. Wool with the high counts are finer and can be spun into longer, finer yarn. For example, a wool grade of 64's would yield 35,840 yards (64 x 560) of yarn or 64 hanks from one pound of clean wool; and a wool grade of 44's would only yield 24,640 yards or 44 hanks per pound.

The **Micron System**, the most technical and accurate system of grading, was largely developed at the Denver Wool Laboratory, USDA. The system separates wool into 16 grades according to the average fiber diameter as measured by a micrometer. Wool too variable to fit in the limits of a grade is placed down one grade. The difference in the average fiber diameter between the finest and coarsest of the 16 grades is extremely small, as a micron is only 1/25,400 of an inch (0.00004). For example, an 80's wool averages about 18 microns which is less than half a 36's wool that averages 39 microns. Today, this system is the standard for describing wools in the United States.

End uses for wool by micron range



The Sheep That Grow

The history of the sheep industry began in Central Asia 10,000 years ago. As early as then, man had discovered that sheep could provide two of life's essentials—a soft warm covering and food. Centuries later and for the same reasons, sheep were to become important in the New World. In 1493, when Columbus made his second voyage to the New World he included sheep on board his ship. In the mid-16th century, Coronado left “the golden fleece” with Pueblo Indians in his trek

across our southland. Even though England tried to discourage the wool industry in the American colonies, yarn and even sheep were smuggled into the new country. Following the American Revolution, men like Washington and Jefferson encouraged the establishment of herds that would provide fine apparel wool.

The Wool

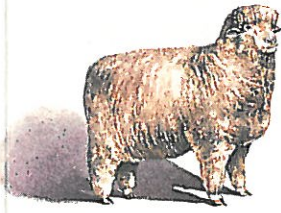
Still a unique resource, sheep fill our needs today, just as they did thousands of years ago. Today's industry provides a broad choice of wool fibers, so the manufacturer may select those best suited for their end-product. The grades of wool vary with some breeds of sheep producing finer quality wool than others. The fine wools could become a worsted fabric such as crepe, challis or gabardine, while the medium grade wool might be ideal for a bulky-knit sweater or fleece coating. Coarse wool may become thick carpeting or durable upholstery.

The following illustrates eighteen common sheep breeds in the U.S., and the wool they grow.



FINE-WOOL BREEDS

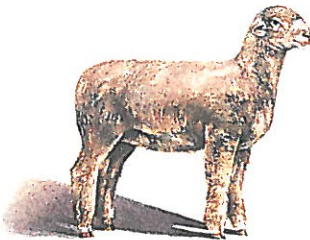
Delaine-Merino



Mature Body Weight
Ram 190-240 lb.
Ewe 125-160 lb.
Growth Rate M-
Wool Type Fine
Blood System Fine
Spinning Count
64's-80's
Average Fiber Diameter
Micron 22-17
Grease Fleece Weight
Ewe 9-14 lb.
Yield 45-55%
Staple Length 2½-4"

The Delaine-Merino was developed from the Spanish Merino, having an unbroken line of breeding more than 1200 years old. Modern Delaine-Merinos are relatively smooth-bodied, intermediate sized, white-faced with wool on the legs, hardy, long-lived, gregarious, and adapted to unassisted lambing. The breed has an extended breeding season, and produce a high-quality fine-wool fleece.

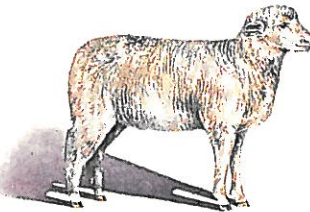
Rambouillet



Mature Body Weight
Ram 200-300 lb.
Ewe 140-180 lb.
Growth Rate H-
Wool Type Fine
Blood System ½-Fine
Spinning Count
60's-80's
Average Fiber Diameter
Micron 24-19
Grease Fleece Weight
Ewe 10-15 lb.
Yield 45-55%
Staple Length 2½-4"

Developed from the Spanish Merino in France and Germany, the Rambouillet is the foundation of most Western U.S. range flocks. White-faced with wool on the legs, the Rambouillet is large, rugged, medium to fast growth, long-lived, gregarious, and adaptable to a wide variety of arid range conditions. The breed has an extended breeding season, and produces a high-quality, fine-wool fleece.

Debouillet

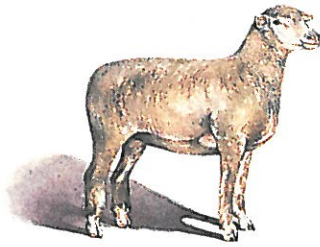


Mature Body Weight
Ram 220-275 lb.
Ewe 125-160 lb.
Growth Rate M-
Wool Type Fine
Blood System Fine
Spinning Count
64's-80's
Average Fiber Diameter
Micron 22-18
Grease Fleece Weight
Ewe 9-14 lb.
Yield 45-55%
Staple Length 3-5"

The Debouillet breed was developed in New Mexico in 1920 from Delaine-Merino and Rambouillet crosses. The Debouillet is well-adapted for southwest range sheep production, are medium-sized, and white-faced with wool on the legs. They are hardy, gregarious, and adaptable to unassisted pasture lambing. They produce a high quality fine-wool fleece.

MEDIUM-WOOL BREEDS

Targhee*



Mature Body Weight
 Ram 200-300 lb.
 Ewe 140-200 lb.
 Growth Rate M+
 Wool Type Medium-Fine
 Blood System 1/2
 Spinning Count
 58's-64's
 Average Fiber Diameter
 Micron 25-21
 Grease Fleece Weight
 Ewe 10-14 lb.
 Yield 45-55%
 Staple Length 3-5"

Developed in 1926 by the U.S. Sheep Experiment Station, Dubois, Idaho, the Targhee has 3/4 fine-wool and 1/4 long-wool breeding from Rambouillet x Lincoln and Rambouillet x Corriedale crosses. They are predominantly located in the intermountain and northern states. The Targhee is relatively large-sized, white-faced with wool on the legs, and adaptable to varied climate and forage conditions. They herd well, produce good market lambs, and yield a heavy, medium-wool fleece with good staple length.

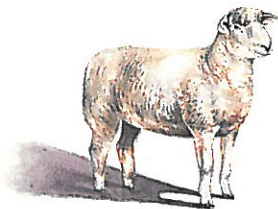
Columbia*



Mature Body Weight
 Ram 250-350 lb.
 Ewe 160-240 lb.
 Growth Rate H
 Wool Type Medium
 Blood System 1/2-1/4
 Spinning Count
 50's-62's
 Average Fiber Diameter
 Micron 30-23
 Grease Fleece Weight
 Ewe 12-16 lb.
 Yield 45-55%
 Staple Length 4-6"

Originating in the U.S., the Columbia was developed in 1912 from Lincoln x Rambouillet crosses. Columbias are relatively hardy, gregarious and good mothers. They are large with white faces and wool on the legs, and are increasingly used to sire crossbred market lambs. They yield heavy, medium-wool fleeces with good staple length.

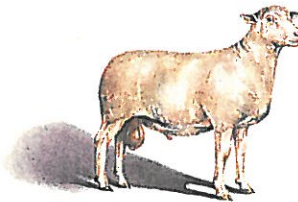
Corriedale*



Mature Body Weight
 Ram 220-275 lb.
 Ewe 150-200 lb.
 Growth Rate M
 Wool Type Medium
 Blood System 1/2-1/4
 Spinning Count
 50's-58's
 Average Fiber Diameter
 Micron 31-25
 Grease Fleece Weight
 Ewe 10-15 lb.
 Yield 50-60%
 Staple Length 3 1/2-6"

Corriedale sheep originated in New Zealand from Lincoln and Leicester x Merino crosses, and was imported into the U.S. in 1914. They are medium-sized, white-faced with wool on the legs, and generally located in the farm flock states. The Corriedale produce good market lambs, are moderately prolific, and yield heavy, medium-wool fleeces with good staple length.

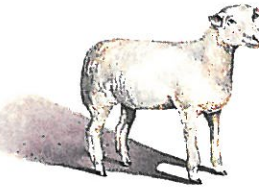
Finnsheep*



Mature Body Weight
 Ram 160-220 lb.
 Ewe 120-160 lb.
 Growth Rate L
 Wool Type Med. to Long
 Blood System 1/2-1/4
 Spinning Count
 48's-60's
 Average Fiber Diameter
 Micron 31-24
 Grease Fleece Weight
 Ewe 4-8 lb.
 Yield 50-70%
 Staple Length 3-6"

The Finnsheep originated in Finland, and was imported into Canada in 1966 and the U.S. in 1968. They are white-faced with bare head and legs, and primarily used in the U.S. to produce crossbred ewes. The breed is highly prolific, and noted for early puberty, easy lambing, good lamb vigor at birth, and excellent maternal instincts. They yield a medium wool with good staple length.

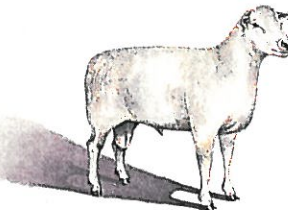
Dorset** (Polled and Horned)



Mature Body Weight
 Ram 225-275 lb.
 Ewe 150-200 lb.
 Growth Rate M
 Wool Type Medium
 Blood System
 Low 1/2-3/8's
 Spinning Count
 46's-58's
 Average Fiber Diameter
 Micron 33-26
 Grease Fleece Weight
 Ewe 5-8 lb.
 Yield 50-65%
 Staple Length 3-4 1/2"

Originating in Southern England, the Dorset (Horned) was imported into the U.S. in 1885. In 1948, a mutation occurred resulting in the Polled Dorsets, which are now a popular commercial breed in the farm flock states. They are also used as a cross with fine-wool ewes to produce crossbred females that tend to breed out of season. Dorsets are medium-sized, white-faced with wool on the legs, heavy milking and yield medium-wool fleeces and desirable carcasses.

Montadale**



Mature Body Weight
 Ram 200-275 lb.
 Ewe 160-180 lb.
 Growth Rate M-
 Wool Type Medium
 Blood System 1/2-3/8's
 Spinning Count
 56's-58's
 Average Fiber Diameter
 Micron 30-25
 Grease Fleece Weight
 Ewe 7-11 lb.
 Yield 50-60%
 Staple Length 3-5"

The Montadale was developed in the U.S. from Cheviot x Columbia crosses, and is used primarily in the farm flock states. The breed is medium-sized with a white-face and bare head and legs. They are fairly prolific and are good milkers with good maternal instincts. Montadales produce desirable carcasses and a medium wool with good staple length.

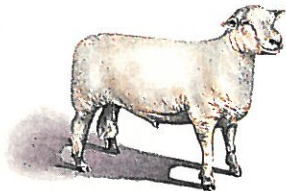
MEDIUM-WOOL BREEDS



Cheviot**

Mature Body Weight
 Ram 160-200 lb.
 Ewe 120-160 lb.
 Growth Rate L
 Wool Type Medium
 Blood System
 Low $\frac{1}{4}$ - $\frac{3}{8}$'s
 Spinning Count
 46's-56's
 Average Fiber Diameter
 Micron 33-27
 Grease Fleece Weight
 Ewe 5-8 lb.
 Yield 50-65%
 Staple Length 2 $\frac{1}{2}$ -4"

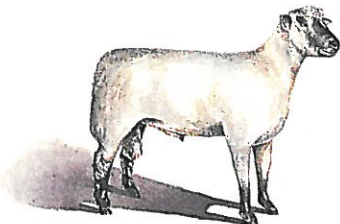
The Cheviot originated in the hill country of Scotland, and was imported into the U.S. in 1838. They are small-sized, white-faced with bare head and legs, and are best adapted to northern climates. The breed is moderately prolific, easy lambers, good milkers, and produce a desirable carcass at light weights. They produce a high yielding medium wool.



Southdown**

Mature Body Weight
 Ram 180-230 lb.
 Ewe 120-180 lb.
 Growth Rate L
 Wool Type Medium
 Blood System
 $\frac{3}{8}$'s- $\frac{1}{4}$ '
 Spinning Count
 50's-58's
 Average Fiber Diameter
 Micron 30-25
 Grease Fleece Weight
 Ewe 5-8 lb.
 Yield 40-55%
 Staple Length 2-3"

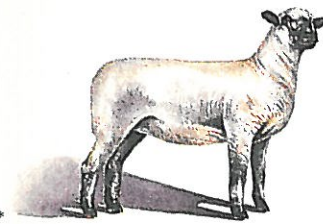
One of the oldest breeds of sheep, the Southdown originated in England. Imported into the U.S. in 1803, the Southdown is best suited to farm flock production of hot-house lambs or meaty carcasses at light weights. They are medium-to small-sized with a light brown face and wool on the legs. The Southdown is fairly prolific, with average milking ability and yields a medium-wool fleece.



Oxford**

Mature Body Weight
 Ram 225-325 lb.
 Ewe 150-200 lb.
 Growth Rate M+
 Wool Type Medium
 Blood System
 Low $\frac{1}{4}$ - $\frac{1}{2}$ '
 Spinning Count
 46's-54's
 Average Fiber Diameter
 Micron 34-28
 Grease Fleece Weight
 Ewe 7-10 lb.
 Yield 50-60%
 Staple Length 3-5"

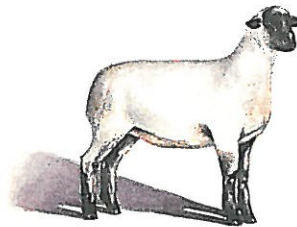
The Oxford originated in England from Hampshire x Cotswold crosses, and was imported into the U.S. in 1846. The Oxford is primarily located in the farm flock states in the U.S. They are medium- to large-sized with a dark brown face and wool on the legs. The breed is fairly prolific, has good maternal instincts, and produces desirable carcasses. They produce a low, medium-grade wool.



Shropshire**

Mature Body Weight
 Ram 225-290 lb.
 Ewe 170-200 lb.
 Growth Rate M+
 Wool Type Medium
 Blood System $\frac{1}{4}$ - $\frac{3}{8}$'s
 Spinning Count
 46's-58's
 Average Fiber Diameter
 Micron 33-25
 Grease Fleece Weight
 Ewe 6-10 lb.
 Yield 50-60%
 Staple Length 3-4"

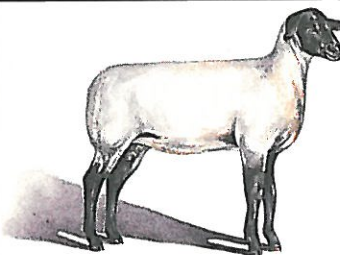
The Shropshire originated in England from native stock and Southdown, Leicester and Cotswold crosses. The Shropshire was imported into the U.S. in 1855. They are located in farm flocks and are used in market lamb production. The breed is medium to large with a dark face and wool on the legs, prolific, good milkers, and produce good carcasses. They produce medium wool.



Hampshire**

Mature Body Weight
 Ram 250-350 lb.
 Ewe 175-250 lb.
 Growth Rate H
 Wool Type Medium
 Blood System $\frac{1}{4}$ - $\frac{3}{8}$'s
 Spinning Count
 46's-58's
 Average Fiber Diameter
 Micron 33-25
 Grease Fleece Weight
 Ewe 6-10 lb.
 Yield 50-60%
 Staple Length 2 $\frac{1}{2}$ -4"

The Hampshire originated in England from Southdown x Wiltshire Horn and Berkshire Knot crosses, and was imported into the U.S. in the 1880's. They are widely used in the U.S. to crossbreed for market lamb production. Hampshires are large-sized with black faces and wool on the legs. The breed is prolific, has good milking ability, good growth and carcass cutability. They produce medium-wool fleeces.



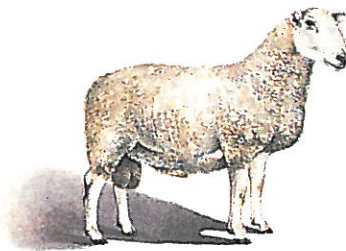
Suffolk**

Mature Body Weight
 Ram 275-400 lb.
 Ewe 200-300 lb.
 Growth Rate H+
 Wool Type Medium
 Blood System $\frac{1}{4}$ - $\frac{3}{8}$'s
 Spinning Count
 46's-58's
 Average Fiber Diameter
 Micron 33-26
 Grease Fleece Weight
 Ewe 4-8 lb.
 Yield 50-60%
 Staple Length 2-3 $\frac{1}{2}$ "

The Suffolk originated in England from Southdown x Norfolk crosses and was imported into the U.S. in 1888. They are widely used in market lamb production, and in farm flock states, are frequently crossbred with fine-wool ewes for this purpose. The Suffolk is the largest-sized breed in the U.S., has a bare head and black face and legs. They are prolific, good milkers, have excellent growth rate and produce superior, high cutability carcasses. They yield a medium-wool fleece and contain black fibers.

COARSE-WOOL BREEDS

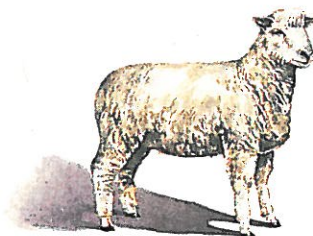
Border Leicester



Mature Body Weight
Ram 225-300 lb.
Ewe 150-225 lb.
Growth Rate M+
Wool Type Long
Blood System
Common & braid—
low ¼
Spinning Count
36's-48's
Average Fiber Diameter
Micron 38-30
Grease Fleece Weight
Ewe 8-12 lb.
Yield 60-70%
Staple Length 5-10"

The Border Leicester originated in England from Leicester x Cheviot crosses. Found in the northern U.S. and Canada, it is particularly adapted to high rainfall, good pasture areas. This medium to large breed is white-faced with bare head and legs. They are moderately prolific, good milkers and mothers, and are useful in crossbred lamb production. They yield a long, coarse wool that spins well.

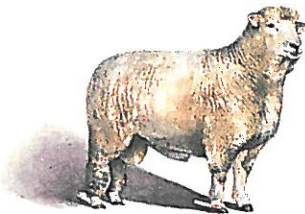
Lincoln



Mature Body Weight
Ram 240-300 lb.
Ewe 200-250 lb.
Growth Rate M
Wool Type Long
Blood System
Common & braid
Spinning Count
36's-46's
Average Fiber Diameter
Micron 41-34
Grease Fleece Weight
Ewe 12-16 lb.
Yield 55-70 %
Staple Length 8-15"

Originating in England, the Lincoln was imported into the U.S. in 1825. The breed was developed from Leicester x Old Lincoln crosses and has made important contributions to the development of other breeds. The Lincoln is a large, hardy breed with a white face and wool on the legs. They produce a heavy fleece that is very long, coarse and ideal for spinning.

Romney



Mature Body Weight
Ram 200-275 lb.
Ewe 150-200 lb.
Growth Rate M-
Wool Type Long
Blood System
Braid—low ¼
Spinning Count
36's-48's
Average Fiber Diameter
Micron 39-32
Grease Fleece Weight
Ewe 10-18 lb.
Yield 55-70%
Staple Length 5-8"

The Romney was developed in England's Romney Marsh region to withstand cold, wet conditions. They were imported into the U.S. in 1904, and are primarily located in the northwestern coastal areas. Romneys are medium-sized, white-faced with wool on the legs, and good mothers with average prolificacy and milking ability. They produce a coarse fleece with good staple length, well-suited for spinning.

OTHER BREEDS / GLOSSARY

Cotswold

Native to the Cotswold Hills of England, they were developed from Leicester, Hampshire and German Whitehead crosses. The Cotswold is large-sized with a white face and wool on the legs, and is noted for its tuft of wool on the forehead. They have good milking ability and maternal instincts. The breed yields a long, coarse fleece of natural wavy curls.

Karakul

The Karakul originated in southern Russia and other Asian countries, and is considered one of the world's oldest breeds. The breed is black, open-faced, has long pendulous ears, and is fat tailed. They are fairly prolific, hardy, easy lambers, have good maternal instincts, and an extended breeding season. They are the foundation for many U.S. flocks for production of long, colored wool for spinning.

Navajo-Churro

The Navajo was developed in the U.S. from the Spanish Churro sheep by the Navajo Indians in Arizona, New Mexico and Utah. Efforts are in progress to preserve this unique breed. They are hardy, surviving under extremely harsh desert conditions. The breed is normally white-faced with white wool, but may also include brown, reddish-brown, gray and black fleece colors. The original Navajo had a 4-6 inch coarse outer fleece coat and a finer 2-3 inch inner fleece coat, with the wool being used to weave the famous Navajo blankets.

Panama

The Panama breed originated in Muldoon, Idaho, in 1812 from Rambouillet ram x Lincoln ewe crosses, the opposite of the cross that produced the Columbia breed. The Panama resembles the Columbia, but is more intermediate in size. They are white-faced with wool on the legs and produce a medium wool. The breed is best suited to the U.S. western range where ample feed is available.

Polypay

The Polypay is a breed developed in the 1970's by the U.S. Sheep Experiment Station at Dubois, Idaho and Nicholas Farms at Sonoma, California from initial crosses of Targhee x

Dorset and Rambouillet x Finnsheep breeds. The breed is medium-sized, white-faced and most appropriate for high potential feed producing areas. Body size, type and fleece traits are variable because of the recent formation of this breed.

Tunis

The Tunis originated in North Africa and was imported into the U.S. in 1799. Purebred flocks were popular in the South until almost destroyed during the Civil War. They are medium-sized with a red or tan face and legs, pendulous ears, no horns, a medium fat tail, and no wool on the head and legs. The Tunis tend to breed out-of-season and produce a medium-wool fleece.

GLOSSARY

Grade

A numerical designation of wool fineness based on average fiber diameter and variation of fiber diameter.

Fineness

This term refers to fiber diameter.

Grease Fleece Weight

Refers to the weight of the fleece as it comes from the sheep. Grease wool includes natural grease, yolk and suint plus acquired impurities like tags, sand, dirt, brands or paints.

Clean Wool Yield

Clean wool is what remains after dirt and non-wool material (shrinkage) are removed. Expressed as a percentage, it is 100% less the Shrinkage = Yield.

Staple Length

Although not considered in officially determining wool grade, length is an important physical property of the wool fiber. Unstretched staple is representative of average fiber length in a fleece or top. Different fiber lengths are used in different fabrics and products, and processed on different types of machinery.



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