Sheep have played an important role in human history. They were among the first species to be domesticated and provided both meat for food and wool for clothing. Sheepskin was also used for clothing and shelter.

Depending on the breed, sheep range in height and weight. Ewes typically weigh between 99 and 220 pounds, while rams weigh between 99 and 350 pounds. Ewes are usually bred in the fall and give birth in the late winter and early spring. Lambs are sold to market at approximately four to seven months of age and weigh between 115 and 140 pounds.

Like cattle, sheep are ruminants, which means they have four compartments in their stomach. Sheep do not have any upper front teeth. When eating forages, such as grass and alfalfa, they close the lower teeth against the dental pad of the upper jaw.

Today, sheep are used for their meat, wool and milk. The U.S. is a large importer of sheep milk cheeses, such as Feta, Ricotta, Romano and Roquefort. Most sheep milk cheeses are imported from France, Greece, Italy and Spain. Other products made from sheep include: cosmetics, lubricants, piano keys and many others.

What are Sheep?

DID YOU KNOW?

- There are over 40 breeds of sheep in the U.S. and approximately 900 different breeds around the world.
- Sheep do not have teeth in their upper front jaw.
- One pound of wool can make ten miles of yarn.
- There are 150 yards (450 feet) of wool yarn in a baseball.
- Professional sheep shearsers can shear one sheep in under a minute.

**SHEEP AND THEIR DIET**

**Young Lamb**
The young lamb is still getting most of its nutrition from its mother, plus the following in its diet:

- Corn—64%
- Hay—28%
- Soybean Meal—7%
- Calcium Supplement—1%

These are approximations based on sample diets. Trace minerals, vitamins and other supplements may also be added. Animals eat to meet their energy (calorie) needs each day—they do not overeat. Young animals that are actively growing have greater requirements for protein than older animals. As the animal gets older, the protein needs (soybean meal) decrease.

**Market Lamb**
“Finishing Diet”

<table>
<thead>
<tr>
<th>Type of Meat</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork</td>
<td>40 percent</td>
</tr>
<tr>
<td>Beef</td>
<td>32 percent</td>
</tr>
<tr>
<td>Poultry</td>
<td>22 percent</td>
</tr>
<tr>
<td>Lamb and Mutton</td>
<td>6 percent</td>
</tr>
</tbody>
</table>

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**WORLD MEAT CONSUMPTION**

<table>
<thead>
<tr>
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<tr>
<td>Pork</td>
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</tbody>
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These are approximations based on sample diets. Trace minerals, vitamins and other supplements may also be added. Animals eat to meet their energy (calorie) needs each day—they do not overeat. Young animals that are actively growing have greater requirements for protein than older animals. As the animal gets older, the protein needs (soybean meal) decrease.

**U.S. MEAT CONSUMPTION**

<table>
<thead>
<tr>
<th>Type of Meat</th>
<th>Lbs. per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork</td>
<td>46.7 lbs.</td>
</tr>
<tr>
<td>Beef</td>
<td>57.3 lbs.</td>
</tr>
<tr>
<td>Poultry</td>
<td>100.4 lbs.</td>
</tr>
<tr>
<td>Lamb and Mutton</td>
<td>0.88 lbs.</td>
</tr>
</tbody>
</table>

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**VOCABULARY**

- **Ewe**: a female sheep of any age.
- **Fleece**: the outer covering of wool on a sheep.
- **Flock**: a group of sheep that live, travel or feed together.
- **Lamb**: baby sheep. The meat of a sheep that is usually 4-6 months old is also referred to as lamb.
- **Lambing**: to give birth to a lamb or lambs.
- **Lanolin**: an oil extracted from sheep wool and used in cosmetics and lubricants.
- **Mutton**: meat of an adult sheep.
- **Ram**: a male sheep used for breeding.
- **Ruminant**: animals, such as sheep, that have multiple compartments in their stomach. They first chew their food to soften it, swallow it and then return it to their mouth for continued chewing. This is called chewing the cud.
- **Shearing**: removal of the wool from a sheep.
- **Shepherd**: a person who takes care of sheep (also called a sheepherder).
- **Wether**: a male sheep not used for breeding.
- **Wool**: fiber covering on a sheep.
United States Sheep Production

<table>
<thead>
<tr>
<th>State</th>
<th>Year 2010 Sheep &amp; Lamb Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>1</td>
</tr>
<tr>
<td>California</td>
<td>2</td>
</tr>
<tr>
<td>Texas</td>
<td>3</td>
</tr>
<tr>
<td>Wyoming</td>
<td>4</td>
</tr>
<tr>
<td>Iowa</td>
<td>5</td>
</tr>
<tr>
<td>Southdown</td>
<td>3</td>
</tr>
<tr>
<td>Cheriot</td>
<td>3</td>
</tr>
<tr>
<td>Oxford</td>
<td>5</td>
</tr>
<tr>
<td>Columbia</td>
<td>5</td>
</tr>
</tbody>
</table>

SHEEP BREEDS: Suffolk, Hampshire, Shropshire, Dorset, Corriedale, Montadale, Southdown, Cheriot, Oxford, Columbia

History of Sheep

8000 BC — Sheep were domesticated.
3500 BC — Man learned to spin wool.
1200 — The spinning wheel was invented.
1493 — Sheep were first brought to America by Columbus.
1664 — There were 10,000 sheep in the colonies. The general court of Massachusetts passed a law requiring youth to learn to spin and weave.
1688 — America began exporting wool goods.
1773 — John Kay invented his "flying shuttle," one of the key developments in the industrialization of weaving. It allowed a single weaver to weave much wider fabrics, and it could be mechanized. Automatic spinning followed.
1767 — James Hargreaves, an English weaver, invented the spinning Jenny with multiple spindles mounted side by side. With this development, one spinner could operate as many as 120 spindles at a time.
1769 — The first American woolen mill was established.
1789 — New England was the first area to establish a spinning and weaving industry. It initially began in homes, and then later in small factories as it continued to grow. Eventually the first water powered textile factories were established in Hartford, Connecticut in 1798.
1888 — America began exporting wool goods.
1793 — James Hargreaves invented the spinning floor, which allowed a single weaver to operate as many as 120 spindles at a time.
1798 — President George Washington was inaugurated in a suit made of American sheep wool, as was Thomas Jefferson in 1801.
1801 — Seth Adams was credited with bringing the first flock of Merino sheep to Massachusetts in the United States. Americans hailed the introduction of this fine wool animal as critical to the manufacturing industry.
1809 — President James Madison was inaugurated in a jacket woven from wool of sheep raised at his home in Virginia.
1865 — The first successful spinning machine was invented by Fred Weir and John Howard.
1913-1921 — President Woodrow Wilson brought a flock of sheep to trim the White House grounds during World War 1.

Wool Buyer, Shepherd Shearing Contractor, Animal Well-Being Specialist, Animal Nutritionist, Farmer, Veterinarian, Apprentice, Animal Physiologist, Animal Geneticist, Shearer

Spotlight on Careers:

The eight steps in woolen manufacturing:

1. Graze & Sorting — The process of woolen fabric production begins with raw wool. Sheep are sheared once a year and the quality of their wool is measured based on fiber fineness, crimp (or number of bends per inch), length, strength and color. These depend on the different breeds of sheep, as well as climate, diet and geographic location. Hand sorters remove stained wool and foreign materials, and then grade and sort the wool with end use in mind. For each wool grade, fibers from various lots are carefully blended to assure a uniform and consistent fiber mix.

2. Carding — Wool is cleaned by a process referred to as carding. Wool fibers pass through a drum, a series of brushes and squeeze rolls, which remove dirt, water and grease. A dryer at the end of the carding line reduces the wool moisture content to a normal 12%. The wool is then packed into 500 pound bales and shipped for further processing.

3. Lanolin Recovery — Lanolin, or wool grease, is a natural by-product of wool. It is separated from the discharge water of the scouring process, sent to a holding tank, and then neutralized. The lanolin rises to the top, is skimmed off and washed in hot water. A vacuum dryer then reduces the moisture content to 0.25% before it is bleached and filtered. The lanolin, which is used in many cosmetics, pharmaceuticals and lubricants, is then stored in 55 gallon drums and ready for market.

4. Dying — Wool can be dyed at three different stages of production as fiber (stock dyeing), as yarn (package dyeing), or as fabric (piece dyeing). The method selected is determined by the end use of the fabric. A computer scanner “reads” or evaluates a sample color and generates appropriate dye formulas. Dissolved dye is circulated by pumps and electronic systems to control temperature and pressure to ensure rich, permanent color and exact duplication of standard colors.

5. Carding — Carding is the combing of wool fibers into a fine sheet or web, which is then divided into thin, continuous strands called roving. Before carding, several lots of wool are blended to ensure uniform color and quality. A light mist of vegetable oil and water is applied to keep the fibers separate during the carding and spinning operations. Wool stock is weighed in a hopper and then passes through a series of rolls covered with fine wire to smooth out all the fibers. These fibers are divided and rubbed by rolls to form equal sized strands of roving, which is then wound onto large spindles in preparation for the spinning frame.

6. Spinning — Yarn is formed by the drawing out and twisting of the strands of roving, which are delivered to the bobbin. To spin yarn, the roving strands are first mounted on the spinning frame. Roving ends are passed through two sets of rolls and then delivered at a high speed to the bobbin. The yarn is then wound onto large spools in preparation for the spinning frame. The process of woolen fabric production begins with raw wool. Sheep are sheared once a year and the quality of their wool is measured based on fiber fineness, crimp (or number of bends per inch), length, strength and color. These depend on the different breeds of sheep, as well as climate, diet and geographic location. Hand sorters remove stained wool and foreign materials, and then grade and sort the wool with end use in mind. For each wool grade, fibers from various lots are carefully blended to assure a uniform and consistent fiber mix.

7. Weaving — The woven fabric is washed and dried. It is then sheared (shaved), to remove loose fibers and to prepare the fabric for the next stages of production. Sheared fabric is then placed in a loom, where it is stretched and held in place by a series of beams. The warp threads are then strung across the loom, and the weft threads are woven over and under them. This process is repeated until the fabric is completed. The fabric is then inspected, measured and rolled up for shipment.

8. Finishing — The unfurled fabric requires several finishing processes before it is ready for use. Filling is a finishing process unique to wool where fabric is subjected to controlled amounts of heat, moisture, pressure and humidity. The resulting shrinkage produces a softer, more compact fabric. Any remaining vegetable matter is removed, and the wool is washed and dried. It is then sheared (shaved), to remove any surface debris, dirt, and dust. Some fabrics are also treated with a finishing process that imparts a soft, fuzzy nap that is often seen in clothing fabrics or blankets. Fabrics are then inspected, measured and rolled up before being shipped to garment manufacturers.