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## INTRODUCTION

This manual has been developed as a study guide for the Florida State Fair Skillathon and used by the Central Florida Fair Skillathon.

The topic for this year's Skillathon is **nutrition and feeding management**.

The Central Florida Fair recognizes that agricultural education instructors, 4-H agents, parents, and leaders provide the traditional and logical instructional link between youth, their livestock projects and current trends in the animal agriculture industry. **PLEASE NOTE:** This manual is provided as a **study guide** for the skillathon competition and should be used as an additional aid to ongoing educational programs.

Sections are labeled **Junior, Intermediate & Senior, Intermediate & Senior, or Senior** to help exhibitors and educators identify which materials are required for each age level.

\*\* Additional information is noted in the study manual for preparing for the Champion of Champions competition.

### **Juniors (age 8-12 as of September 1, 2010)**

Digestive tract parts identification  
Feed classification & identification

### **Intermediates (age 13-15 as of September 1, 2010)**

Digestive tract functions  
Feed tag analysis  
Aging by teeth

### **Seniors (age 16 and over as of September 1, 2010)**

all of the above plus...  
Evaluating Feed Efficiency  
Evaluating and selecting feedstuffs  
Body Condition Scores

**GOOD LUCK**

# Sheep Nutrition

What an animal eats, how it is digested, absorbed, utilized and what is excreted are the essence of *nutrition*. Good nutrition is basic to good health and production. Proper feeding requires knowledge of nutrients in feedstuffs available to the producer and the nutrient needs of their animals. It also includes an understanding of animal behavior and a management strategy that allows animals to consume all that is required without causing digestive upset. Though general rules of thumb are helpful, each situation may require adjustments in order to optimize growth and production.

*Nutrients* are substances in the diet that support normal body functions. Some nutrients can be manufactured in the animal's body and are classified as *dietary non-essential*. *Dietary essential* nutrients must be provided in the ration. Nutrients can be classified into six groups: *water, carbohydrates, fats (lipids), proteins, vitamins and minerals*.

*Water* is the most essential nutrient and is involved in all body functions. It is the most abundant and therefore the cheapest nutrient. Animals receive water from drinking as well as from feeds that contain water. An animal not receiving enough water will not eat well. Factors that affect an animal's water consumption are the animal's size, feed intake, environmental temperature, humidity, and water quality.

*Proteins* function as the basic structural unit of the animal body and in metabolism. Protein is the main component of the organs and soft structures of the animal body, with the exception of water. The dietary requirement for protein is highest in young, growing animals. All proteins are composed of simple units called amino acids. The particular amino acids in a protein determine the quality of that protein. Protein is one of the most expensive portions of the diet.

*Carbohydrates* are organic compounds formed in plants by the process of photosynthesis. They constitute about 75% of the dry weight of plants and grain. Carbohydrates serve as a source of energy in the body. A surplus of carbohydrates is transformed into fat and stored.

*Fats* function much like carbohydrates in that they serve as a source of energy. Fats produce 2 ¼ more energy than carbohydrates when digested; therefore a smaller amount is required to serve the same function.

*Vitamins* are essential for the development of normal tissue and necessary for metabolic activity. They are effective in the animal body in small amounts. When not eaten correctly and in the right amounts, a specific deficiency disease can result or toxicity could result if eaten in extremely high amounts. Vitamins are classified as being either fat soluble (A, D, E, K) or water soluble (B complex & C).

*Minerals* are inorganic, solid, crystalline chemical elements. They are classified as being either macro (Ca, P, Na, Cl, K, Mg & S), meaning found in high concentrations or micro minerals (Cr, Co, Cu, F, Fe, I, Mn, Mo, Ni, Se, Si, & Zn), meaning found in trace amounts. Calcium makes up nearly 50% of the total body mineral, phosphorus composes 25%, and other minerals make up the remaining 25%. Minerals function in protein synthesis, oxygen transport, and in skeletal formation and maintenance.

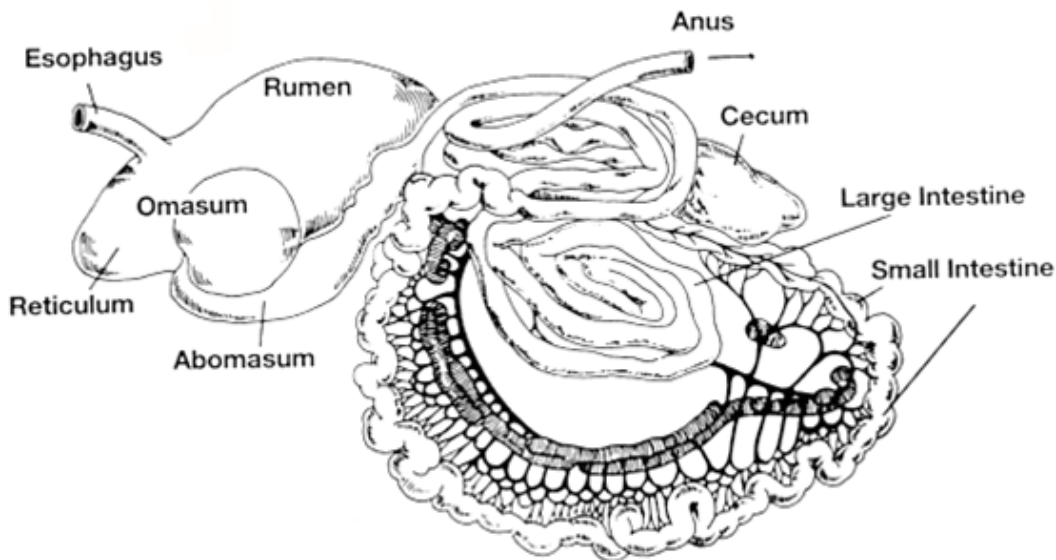
Specific nutrient requirements vary between species but also between individuals. Factors such as weight, environmental temperature, and level of production must be considered when determining optimum nutrient levels in a ration. Though it is tempting to provide more than enough as insurance, some nutrients cause problems (toxicity) if fed in excess. Also, the feeding of livestock accounts for 45-75% of production costs, so overfeeding shrinks profits. Too much of a good thing is not good.

Juniors, Intermediates and Seniors

## Digestive Anatomy

You are what you eat sounds silly but is somewhat true. Farm animals are grouped by what they eat, which is based on the type of digestive system they possess. *Herbivores* are vegetarians (cattle, sheep, goats, rabbits). *Carnivores* are flesh eaters (dogs). *Omnivores* eat both plants and flesh (pigs, chickens, humans). Based on the digestive system, animals are grouped as *monogastric* or *simple stomach* (pig), *polygastric* or *ruminant* (cattle, sheep, goats), *avian* (chickens), or *pseudo-ruminants* with a functional cecum (rabbits). Understanding the digestive system is fundamental to selecting the proper feeds and feeding system for your animal.

After studying this manual, you should be able to identify the parts of the digestive tract of a sheep and tell the function of each part.



## Feed Classification and Identification

The “stuff” fed to animals in order to meet their nutritional needs are called feeds. The National Research Council (NRC) produces many publications on nutrient requirements of animals and nutrient content of most feedstuffs. Most youth purchase “complete rations”, however, it is helpful to know what goes into those rations. Visit the web site: <http://www.ca.uky.edu/agripedia/AGMANIA/FEEDID/INDEX.asp> and study feed ingredients so you can visually identify those ingredients typically used in livestock feeds.

Though we generally group feeds into roughages (high fiber, >18% crude fiber (CF), less digestible) and concentrates (low fiber, <18% CF, more readily digestible). There are 8 international feed classes based on content and use.

1. Dry forages and roughages - cut and cured products with >18%CF such as hay, straw, corn cobs, shells and hulls, paper, wood by-products and stover.
2. Pasture, range plants and forages fed fresh - all forages not cut or cut and fed fresh.
3. Silages and haylages - ensiled forages such as corn, alfalfa and grass.
4. Energy feeds - products with <20% crude protein (CP) and <18%CF like cereal grains (corn, oats, wheat), mill byproducts, beet and citrus pulp, molasses, animal, marine and vegetable fats, nuts, roots and tubers.
5. Protein supplements - products with >20% CP or more protein from animal origin as well as oil meals like gluten, legume seeds, milling by-products of grains, brewery and distillery by-products, yeast, non-protein nitrogen.
6. Mineral supplements
7. Vitamin supplements
8. Non-nutritive additives - supplements such as antimicrobials, antifungals, antibiotics, antioxidants, probiotics, buffers, coloring material, flavors, hormones and medicines.

## Digestive Function

Intermediates and Seniors

The physical and chemical changes of feed within the gastrointestinal tract that allow nutrients to be released and absorbed into the body are called digestion. There are significant differences in the digestive processes between species. The type of digestive system an animal has determines what the animal can successfully use as feed. Complicated feed (forage) requires a complicated digestive tract (ruminant). The steps in digestion include: prehension (gathering), mastication (chewing), salivation, deglutition (swallowing), microbial, enzymatic and chemical breakdown, absorption of nutrients, defecation, and micturition (urination). For a review of rumen anatomy visit: <http://mc050.k12.sd.us/Ruminant%20Digestive%20System.ppt>

Mouth - Upper dental pad, lower incisors and both upper and lower molar teeth used in prehension, mastication, and salivation

Esophagus - Hollow muscular tube that transports food from the mouth to the stomach

Stomach - Four compartments; Rumen, Reticulum, Omasum and Abomasum (8-16 gallons)

Rumen - Large, hollow, muscular compartment that almost entirely fills the left side of the abdomen, functions in storage, soaking, mixing and microbial fermentation, and acts to absorb some specific nutrients (volatile fatty acids, ammonia). (5-10 gal.)

Reticulum- Nicknamed honeycomb, functions in moving ingested feed into the rumen or into the omasum and regurgitation of partially chewed food during rumination. Has very thick walls, traps foreign objects. (1/2 gallon)



Omasum - Nicknamed “many plies” or butcher’s Bible, reduces particle size and removes water. It is located on the right side and holds (1/4 gallon)



Abomasum- This is the glandular portion of the stomach that produces acid. It is located on the right, is called the true stomach and is where enzymatic digestion begins. (0.5-1 gallon)

Sm. Intestine- Pancreatic and intestinal juices break down proteins and carbohydrates while bile from the liver breaks down fats. The first section (duodenum) is involved in digestion, and the next two sections (jejunum & ileum) are actively involved in nutrient absorption. (2-2 ½ gallons and 80 feet)

Lg. Intestine- Mainly absorbs water and end products of microbial digestion. The cecum has little function in ruminants. The colon is the site for water resorption and storage reservoir of undigested material that passes out of the rectum as feces. (1/2-1 gallon)

## Feed Tag Analysis

Intermediates and Seniors

It is required by law that all commercial feed products carry a proper label. You should be able to read and understand the information on a feed tag. Some of the information included will be: net weight in pounds, company brand name (trade name), product name (class or use), product type (textured, pelleted, extruded, etc.) purpose statement, warning or cautions, active drug ingredient (when applicable), guaranteed analysis (protein, fat, fiber, etc.), feed ingredients in order of content, company name and address, detailed use directions, other feeds (suggestions for other feeds in the total program). Visit a feed store and study the tags on several types of feeds and determine which feeds are best suited to your program and which are the best value in terms of nutrients per dollar. Be prepared to interpret the information on a feed tag.

### GUARANTEED ANALYSIS:

**Crude Protein:** not less than \_\_%. This number represents nitrogen content of feed and does not give a clear picture of protein quality, (e.g. amino acid profile). If all of the protein is not from “natural” ingredients (e.g. contains urea or a similar product) the following statement must be added, “This includes not more than \_\_% equivalent protein from non-protein nitrogen”

**Crude Fat:** not less than \_\_%, typically 1 to 3%. At equal volumes fat contributes 2.25 times the amount of energy compared to carbohydrates. Increased crude fat levels can decrease digestion of forages (e.g., hays and grasses). Fat can be added to the diet in hot weather to maintain energy level when intake decreases

**Crude Fiber:** not more than \_\_%. The higher the Crude Fiber, generally, the lower the digestible energy of the feed. The price should reflect this lesser energy, but frequently does not.

Some manufacturers also show minimum/maximum quantities of calcium and phosphorus and other macro and micro minerals. Units of vitamins A and D could also be shown.

**Ingredients:** listing on the tag does not necessarily identify individual feedstuffs. Instead, it uses *categories* of feedstuffs, e.g., *grain products* (such as corn, oats, barley, wheat), *processed grain by-products* (bran, brewers grain, hominy), *plant protein products* (soybean meal, cottonseed meal, etc.), *molasses products* (cane or beet molasses, dehydrated molasses, wood molasses), and *forage products* (alfalfa meal or leaf meal). The phrase, *roughage products*, identifies the presence of cottonseed hulls or other types of hulls or ground hays. This total must be shown as a percentage of the feed. Their presence will cause the crude fiber guarantee to be abnormally high (16-26% or more) and, as indicated above, lowers the digestible energy content.

The feed tag will also list sources of minerals, any preservatives used, and any vitamin supplements present or used.

The fictitious tag below is included to encourage you to think about what information is actually available on the feed tag and to consider what it means to you in your feeding program.

## Lamb Finisher Feed

### GUARANTEED ANALYSIS

|  |          |
|--|----------|
| Crude Protein, Minimum .....   | 15.0%    |
| (This includes not more than 1.0% equivalent<br>crude protein from non-protein nitrogen) |          |
| Crude Fat, Minimum .....   | 3.0%     |
| Crude Fiber, Maximum .....   | 6.5%     |
| Calcium (Ca), Minimum .....  | 0.6%     |
| Calcium (Ca), Maximum .....  | 1.1%     |
| Phosphorus (P), Minimum .....  | 0.3%     |
| Iodine (I), Minimum .....  | 0.00015% |
| Salt (NaCl), Minimum .....   | 0.25%    |
| Salt (NaCl), Maximum .....   | .075%    |

### INGREDIENTS

Ground Newspapers, Ground Uncooked Turkey Feathers, Ammonium Nitrate, Super Phosphate, Tincture of Iodine, Used Crankcase Oil, Hardwood Sawdust, Ground Marble Chips, Vitamin A & D Oil, Ground Shoes (without Rubber Soles), Barber Shop Sweepings, Salt.

Manufactured By: LEAST IN THE EAST

Selling Directions: For price conscious feeders who are not interested in results.

## Teeth

Intermediates and Seniors

No matter how good your feeding program, if an animal cannot grasp and chew the feed effectively, production will be compromised. Though managers do not routinely mouth their sheep, it is a good idea to know if your animals have “sound” mouths, particularly if they are poor performers. A bonus when checking the teeth is that eruption and wearing patterns of teeth can be used to “age” an animal, particularly those from one to four years old. This useful skill is almost a lost art. Visit the following web sites and learn the steps in aging by teeth. View pictures of teeth from sheep of different ages then practice on your own animals.

<http://www.smallstock.info/tools/sheep/aging.htm>

[http://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0007/178477/age-of-goats.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0007/178477/age-of-goats.pdf)

## Evaluating and Selecting Feeds

It is easy to look at the price of feed per bag and assume that lower cost is the same as higher value. Spend time thinking about your feeding management situation and the types of feeds you have available. Be prepared to judge the relative value of feeds for various scenarios. Several methods are available to assess the value of a feed.

1. Physical evaluation of feedstuff: Does it look good and smell good? Is it free of dust and mold? Is it fresh? Can you see indicators of quality, such as high stem-to-leaf ratio in hays or a high percentage of corn in a finishing ration?
2. Cost per unit of nutrients: This requires simple analysis and calculations.

### Example:

| Product       | Soy Bean Meal         | Linseed Meal          |
|---------------|-----------------------|-----------------------|
| Crude Protein | 44%                   | 35%                   |
| Cost          | \$9.40 per 100 Pounds | \$5.50 per 100 pounds |

To solve this problem you must determine the value of each feedstuff for protein:

- Do this by dividing the cost by the percentage of protein
    - Soy bean Meal:  $\$9.40/44 = 21$  cents per pound of Crude Protein
    - Linseed Meal:  $\$5.50/35 = 15$  cents per pound of Crude Protein
- Therefore, linseed meal is more economical.

Another way is to look at productivity. If you must feed your animal twice as many pounds at a low cost, but low-protein feed to achieve the desired gain, it could be more cost effective to pay for a higher price but feed less total pounds.

### Example:

Let's look at the feed stuffs from above but add in rate of gain expected for each feed.

| Product       | Soy Bean Meal                              | Linseed Meal                               |
|---------------|--|--|
| Crude Protein | 44%  | 35%  |
| Cost          | \$9.40 per 100 Pounds                      | \$5.50 per 100 pounds                      |
| Rate of Gain  | 1.35 pounds of feed per 0.25 pound of gain | 2.75 pounds of feed per 0.25 pound of gain |

Solve for cost per pound of gain.

- First, determine cost per pound of feed
    - Soy Bean Meal  $\$9.40/100$  pounds = \$0.094 /pound
    - Linseed Meal  $\$5.50/100$  pounds = \$0.055 /pound
  - Next, determine cost per pound of gain
    - Soy Bean Meal:  $\$0.094/\text{pound} \times 1.35$  pounds feed/.25 pound gain = \$0.507/pound gain
    - Linseed Meal:  $\$0.055/\text{pound} \times 2.75$  pounds feed/.25 pound gain = \$0.605/pound gain
- On a cost of gain basis, Soy Bean Meal is more economical.

3. A number of chemical analyses are carried out on feeds by the companies producing them. This information is useful in evaluating quality.
4. An often used method of determining quality is to do a home feeding trial. You may do this already without thinking about it. If you run into problems one year, you make adjustments

the next year. With limited numbers of animals, this is a slow, often costly process.

Seniors

## Evaluating Feed Efficiency

Performance in sheep is evaluated by calculating average daily gain as well as feed efficiency. Feeding management strategies should strive to optimize growth to reach the desired end point in an appropriate time frame. For example; if the beginning of the breeding season is 180 days away and your young ewe must gain 45 pounds in order to reach puberty, the ewe must gain an average of .25 pounds per day. If the ewe eats 1.5 pounds of feed per day for 180 days at that rate of gain, feed efficiency for that period of time is 6 pounds of feed per pound of gain. The cost of gain is determined by multiplying the cost per pound of feed by the pounds of feed per pound of gain. Therefore, in this scenario, \$8.00 per 100 pounds of feed with 6:1 feed efficiency comes out to \$0.48 per pound of gain.

Seniors

## Evaluating Body Condition

Adjustments in feeding management require knowledge of the individual or flock nutritional status. Changes in body condition or fat deposition provide valuable insight. The degree of fatness is evaluated by touch, considering the transverse processes of the vertebrae in the loin region and over the forerib. Below are descriptions of the 5 body condition scores used in sheep production. You should be familiar with this system of evaluation and its applications.

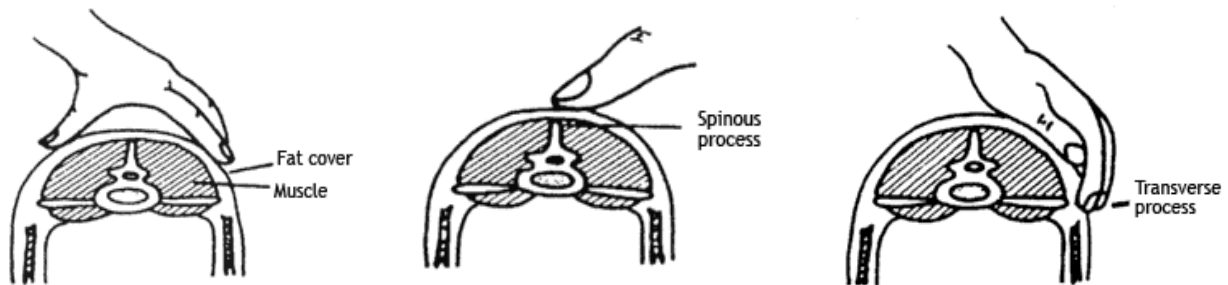
**BCS 1 (Emaciated)** An extremely emaciated ewe, with no fat between skin and bone. Ewes in this body condition have no fat and very limited muscle energy reserves. They appear weak and unthrifty. Wool fleeces are often tender, frowsy and lack luster.

**BCS 2 (Thin)** Ewes in this body condition have only a slight amount of fatty tissue detectable between skin and bone. Spinous processes are relatively prominent. These ewes appear thrifty but have only minimal fat reserves.

**BCS 3 (Average)** Ewes in this body condition have average flesh but do not have excess fat reserves. .  
This condition score includes ewes in average body condition.

**BCS 4 (Fat)** This condition score includes ewes that are moderately fat. Moderate fat deposits give sheep a smooth external appearance

**BCS 5 (Obese)** Ewes that are extremely fat. Excess fat deposits can easily be seen in the breast, flank, and tailhead regions. These ewes have excess fat reserves to the point that productivity may be impaired.



Visit the following web sites and find detailed information regarding body condition scoring:  
[http://cahe.nmsu.edu/sheep/sheep\\_nutrition/sheep\\_nutrition.html](http://cahe.nmsu.edu/sheep/sheep_nutrition/sheep_nutrition.html).

<http://www.smallstock.info/tools/condscor/cs-sheep.htm>

## Processing Feeds\*\*

Because feed constitutes a major portion of the cost of intensive animal production, it is very important that a diet have the right nutrient content and be in a form that will encourage consumption without excessive feed waste. Feeds are often processed by mechanical, chemical or thermal methods in order to alter the physical form or particle size to prevent spoilage, isolate certain parts of the seed or plant, to improve palatability and digestibility, or sometimes to inactivate toxins. Occasionally feed is processed to improve handling. Some methods include: roller mill cracking, grinding, steam-rolled and steam-flaked, pelleting, extruding, popping, drying and cubing.

Obviously, there are costs associated with processing, so the improvements in productivity must offset price increases.

## Poisonous Plants\*\*

Sheep have a stronger resistance to certain toxins than cattle, but there are plants that can poison sheep. These include Death camas, Grease wood, Horse brush, Rubber weed, Sneeze weed, Broom weed, Choke cherry, Copper weed, Desert parsley, Halogeton, Loco, Leu pine, Milk weed, and Veratrum. Visit the following web sites to learn about poisonous plants in the Southeast.

<http://www.ansci.cornell.edu/plants/anispecies.html>

<http://www.caf.wvu.edu/~forage/library/poisonous/page10.htm>

# Common Nutritional Disorders\*\*

| <u>Disorder</u>                       | <u>Chief Cause</u>  |
|---------------------------------------|---|
| Copper toxicity                       | Excess copper in blood is fatal by causing RBC to break down  |
| Hardware disease                      | Wire or nails lodged in reticulum   |
| Ketosis                               | Sudden need for extra energy  |
| Milk fever                            | Sudden need for Ca (lactation)  |
| Acidosis                              | Excess grain consumption  |
| Nutritional muscular dystrophy        | Se or vitamin E deficiency  |
| Grass tetany                          | Mg deficiency   |
| Night blindness                       | Vitamin A deficiency  |
| Goiter                                | Iodine deficiency   |
| Rickets                               | Ca, P, or vitamin D deficiency (young animals)  |
| Anemia                                | Fe, Cu, vitamin B12, or folic acid deficiency   |
| Enterotoxemia<br>(overeating disease) | Rapid growth of Clostridium perfringens after overeating  |
| Founder (laminitis)                   | Too rapid change in the ration.   |
| Photosensitization                    | Some feeds or forages or accumulation of metabolites  |
| Bloat                                 | Legume, succulent forages causing slime producing bacteria to increase and slime causes trapping of gas.            |
| Urinary calculi                       | “water belly” in males; stones block urination. Caused by excess phosphorus and magnesium or imbalance of Ca and P. |

## SHEEP SHOWMANSHIP

### ATTIRE:

Required Dress Code: All exhibitors will be required to be clean and neat and dressed in white, green, dark blue or dark black jeans or slacks with a solid white shirt with a white collar. FFA and 4-H accessories are strongly recommended. No caps or hats. Closed-toed shoes or boots are required..

### Training Sheep for Showmanship

#### **Leading**

To lead a sheep, place one hand on the jaw, keep the head up and alert and put the other hand on the dock or behind the ears. Keep fingers together so no finger marks are left on the wool. Pull up on the dock to get the sheep to move or apply pressure behind the ears. The hand used on the dock or behind the ears does not have to touch the sheep but it should be ready to control the sheep if it gets spooked. When touching the sheep, keep your fingers together.

#### **Turning**

To turn the animal, keep your hand on the jaw, not the throat, and turn its head toward your belt buckle. Slowly move the sheep toward you, switch hands until you stand at the opposite shoulder. This keeps the sheep between you and the judge and allows him or her an uninterrupted view of the animal.

#### **Bracing**

Bracing is tightening the lamb's muscles so it will feel firm and heavily muscled. This is done when the judge handles the animal. This also gives you more control during the handling process. The feet should be positioned correctly before pressure is applied so the

animal will maintain its balance. Once the feet are placed correctly then pressure is applied as firmly as possible, but the sheep should not move and its top should remain straight. Pressure is applied by placing your knee in the animal's chest and by using your hands to elevate the head slightly. **Do not pick sheep's front feet off the ground.**

## **In the Show Ring**

### **Proper Showmanship Procedure**

Enter the showing with a smile on your face. Circle the judge in a clockwise pattern. Be considerate of the animals around you. Walking at a normal pace should leave room in front and behind your animal. This room is necessary to keep other exhibitors from feeling crowded.

Don't crowd your own animal into line. Look for an open place and then move into position to set it up. Always set up the side closest to the judge first. For example, if the judge is viewing the side of your animal, set the two side legs closest to the judge first. If the judge is viewing the rear of the animal, set the two rear legs first.

Always keep your eye on the judge. A good showman knows where the judge is in relation to his/her animal at all times. This enables the showman to follow the judge's directions and commands.

When given a command, complete it as quickly as possible.

Know information about your sheep in case the judge asks questions.

### **Proper Posing Techniques**

1. There are three positions to be aware of when showing:

Rear View - when the judge is behind the sheep, the exhibitor stays in front of the sheep, hands on the jaw, not the throat, of the animal with the feet set the proper distance apart.

Side View- when the judge is facing either the left or right side of the sheep, the showperson sets the legs nearest the judge first. The exhibitor has the most control if he or she reaches over the top of the animal, keeping the sheep between his or her leg at the shoulder and the arm used to set the feet. Some judges prefer reaching under to set the animal's feet.

Front View- when the judge stands in front of the sheep, the showperson stands off to the side, near the shoulder, with the hand on the jaw keeping the animal's head in line with the brisket and backbone. The head should be set at an angle best for the sheep, front legs parallel to each other and set at a distance slightly narrower than shoulder width, and rear legs should be parallel to each other set at distance slightly wider than the front legs.

Changing Sides- to change sides, keep your hand on the jaw and slowly move around the front of the sheep until you stand on the opposite side. This allows you to keep the animal between yourself and the judge for an uninterrupted view.

2. After the animal is set up, move to its shoulder opposite the judge and kneel, making sure to keep the head up and the topline straight. Most judges prefer you not put your knees on the ground, so you do not get sawdust or dirt on the sheep or lose control in the show ring.

3. Remember to concentrate on your animal's position and watch the judge. You should have a calm, confident manner in the show ring.

\* As a tip, on the day before the show, take time to study the show arena. Look for unlevel areas and keep them in mind when showing on show day. You want to set your animal's rear legs in low areas and the front legs on high ground.