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FEEDLOT ACTIVITY PLAN

Dijat Al-Kheir Company
Saweera Lamb Feedlot

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Executive Summary

USAID-*Inma* Agribusiness Program supports the Livestock-Protein Value Chain by working with livestock producers, in this case with ten feedlots, providing them with targeted technical assistance to increase productivity, to lower production and marketing costs, to increase profitability and to generate rural employment. This Feedlot Activity Plan, one in a series of ten, each directed to an individual feedlot, addresses specific problems and issues faced by one particular feedlot and at the same time provides a general handbook of best practices for feedlot management. This Feedlot Activity Plan is written for the Dijat Al-Kheir Company Saweera Lamb Feedlot. Thus the information contained in this report is limited to lamb feeding. Other reports directed to beef feedlots or mixed feedlots will address beef feeding.

This report highlights the strengths of Saweera Lamb Feedlot as well as makes recommendations for improvements that will reduce costs, improve the efficiency of the operation, lead to healthier lambs and if carefully followed should lead Saweera Lamb Feedlot to become a profitable and sustainable enterprise.

Background

A feedlot is a type of animal feeding operation, usually confined feeding in arranged pens, which is used in finishing (fattening) livestock, usually beef cattle and sheep prior to slaughter. Feedlots may contain thousands of livestock or may consist of just a few head. Prior to entering a feedlot, cattle and lambs spend most of their life grazing on rangeland or on irrigated pasture. Once cattle and lambs obtain an entry-level weight, about 200 kg (cattle) and 20 kg (lambs) in Iraq, they are transferred to a feedlot to be fed a nutritionally balanced and specialized diet. In Iraq the primary feed used in the USAID-*Inma* sponsored feedlots include alfalfa hay, barley, corn, wheat, wheat bran, soybean meal, cottonseed meal, vitamin/mineral supplements, and salt. Feedlot diets are usually very dense in food energy, to encourage the deposition of fat, or marbling, in the animal's muscles. The ultimate aim of the finishing process is to produce livestock that will best answer the requirements and desires of the consumer. This is accomplished through an improvement in the flavor, tenderness, and quality of the lean meat which results from marbling (intramuscular fat). In Iraq, cattle will usually gain an additional 200 kg and lambs an additional 40 kg during their time in the feedlot. Once cattle and lambs are fattened up to their finished weight, they are then sold to either local butchers or transported to a slaughterhouse where they are harvested and sold for consumption.

In late 2009 and early 2010 ten feedlots throughout Iraq finished construction and began feeding and finishing livestock. There are six located in northern Iraq (four in Ninawa Province, one in Dahuk Province, and one in Kirkuk Province). The remaining four are located in the provinces of Baghdad, Wasit, Anbar, and Babil. In the beginning, when the feedlots began operation, the following were designated as beef cattle feedlots: Bartella in Ninawa; Al-Qosh in Ninawa; Al-Juburi in Kirkuk; Blann in Dahuk; Al Fallah in Ninawa; Goba in Ninawa, and Fallujah in Anbar. The remaining feedlots of Taji in Baghdad; "Hawks of Iraq" in Babil; Saweera in Wasit were designated as sheep only feedlots. At the current time three of the feedlots have expressed interest in feeding a combination of both beef cattle and lambs. Those pursuing feeding both beef cattle and lambs include: Al-Qosh, Blann, and "Hawks of Iraq".

Some goals set forth for the feedlots by the USAID-*Inma* Agribusiness Program include: greater profitability due to better health; nutrition; animal and market management; increased investment in red meat value chain through the development and linkages with new enterprises; increased number of confined feeding operations, which will begin using USAID-*Inma* technical information in the development of various profitable enterprises; establish relationships between feedlots and meat processors; and establish relationships between feedlots and feed laboratories (USAID-*Inma* Annual Work Plan, 2010). The two major goals of the USAID-*Inma* Livestock Technical Team is for USAID-*Inma* sponsored feedlots to be at maximum livestock capacity to ensure full profit potential and for Iraq to increase self-sustainability in red meat production.

Note to Saweera Lamb Feedlot

Now is an exciting time to be part of the livestock industry in Iraq. As an USAID-*Inma* sponsored feedlot owner, you are a truly a pioneer in the livestock industry of Iraq in owning and operating one of only ten commercial feedlots. There is money to be made with this business venture and at the same time provide the people of Iraq with the red meat they

demand. This activity plan was created to help your feedlot achieve profitability and increase red meat production in Iraq. The plan has been developed specifically for your feedlot and addresses the issues you face. This plan will serve as a guide to help you go step by step in order to achieve success. The first part of this report is a general overview. The second part will be the actual activity plan that will go into detail on the actual technical steps you can take in operating a successful feedlot business.

General Overview of Saweera Feedlot

Currently the Saweera Feedlot is not operating. This feedlot is owned by 2 partners. The partners had a dispute and as a result the feedlot is not functioning. I was unable to visit the feedlot because there were no lambs being fed. USAID-*Inma* held multiple meetings with both partners in the Baghdad office to try and resolve the issues between them. None of the meetings were successful. USAID-*Inma* had no choice but to withdraw technical assistance because of the failure of the partners to stock their feedlot with lambs. USAID-*Inma* cannot provide technical assistance to an empty feedlot and USAID-*Inma* cannot serve as a legal mediator between disputing business partners. If the issues between the partners are resolved USAID-*Inma* will resume technical assistance. This activity plan is being provided to the owners of this feedlot in the hope that they decide to purchase lambs and operate once again.

Activity Plan

This Activity Plan is a step by step guide for the feedlot owner. This Activity Plan will go through each phase of the feedlot process from start to finish. Each chapter of the Activity Plan provides detailed technical information that will aid the owner in their day to day operation of the feedlot. The major phases of a lamb feedlot operation include: selecting and purchasing lambs, receiving lambs into the feedlot, purchasing feed for the animals, feeding and nutrition of the animals, feedlot animal health, and marketing fattened lambs.

Chapter I - Purchasing Lambs

Lamb Selection

The first criteria when selecting lambs in Iraq should be health. A sick lamb will not eat to their full potential and you risk the lamb dying. Second, select for genetics and size. Purchase lambs that are as close to the same weight and size as possible. Find a trusted source for purchasing your feedlot lambs. Purchase in large lots from the same trusted producer if possible. Find producers that have good management programs and who are serious about genetic improvement in their herds. A good feeding program will not be as effective if you are feeding genetically inferior lambs. Approximately 60 to 70% of the total cost of feeding out a lamb comes from the purchase price. For this reason it is important to find a reliable source of healthy, well-bred lambs at reasonable prices. Weight of animals at the start of the feeding operation governs the duration of feeding and the types and amounts of feedstuffs needed. Lightweight (15-20 kg) animals can utilize more roughage, whereas heavier lambs (>25 kg) require more concentrates and a shorter feeding period. Light weight sheep and goats are more desirable for conditioning based on a larger proportion of roughage, whereas heavier animals perform best where high concentrate diets are used. It is therefore best to use sheep

and goats with weights ranging from 20-25 kg for the fattening operation to take advantage of both situations.

Chapter 2- Receiving Lambs

Receiving Animals

Newly purchased lambs destined for the feedlot are coming from grazing situations throughout Iraq. Normally they are not accustomed to concentrate (grain) based diets. They are also transported long distances from the point of the purchase to the feedlot. Needless to say these lambs arrive at a feedlot stressed and not accustomed to the feed ration being placed in front of them. A series of important steps are needed to make the transition from grazing to the feedlot as comfortable and smooth as possible. It is important to not cause additional stress by rough handling or shouting during loading, transportation, and unloading. Make sure lambs are not loaded or worked during the heat of the day. Load, transport, and unload during early morning or late at night to avoid heat stress.

Immediately when the lambs arrive at the feedlot unload them in the quarantine pen and then the following steps should be taken:

- Let them have a good rest.
- They should be fed a ration of only forage containing 50% grass hay and 50% alfalfa hay. Have clean water available at all times.
- Have salt/mineral blocks available at all times.
- After two or three days of rest and feeding the forage only ration start to introduce concentrate to the ration at the rate of 150 grams of concentrate per head per day. Increase this amount by 50 grams of concentrate each day until the lambs are on full feed. This process will take approximately 2 weeks. Be sure if feeding the lambs twice per day, feed early in the morning and when the sun has gone down in the evening.
- Lambs that are not accustomed to grain and are started on grain too fast are prone to acidosis. Gradual introduction of grain in rations is essential if grain poisoning is to be avoided. Loose droppings are an early indication of digestive disorders. Lambs on starter rations should be observed twice a day when introduced to grain. If loose droppings are observed, stop increasing grain for a few days until droppings become firm again. If droppings turn watery return to a hay only feeding and then start over again after droppings become firm once again.
- Keep all lambs in the isolation pen for 7 days. During these 7 days any sick lambs should be removed and kept in the sick pen and treated.
- After 7 days in the isolation pen the lambs are now ready to be processed and put into the main feedlot.

The following steps should be followed when processing lambs:

- Treat lambs for internal and external parasites. Ivermectin based drenches (oral) are readily available in Iraq and are the best option for internal parasites as well as some external parasite control. Permethrin based pour on treatments can also be used for external parasite control.
- Vaccinate for enterotoxemia (overeating disease) types C, D, and T. Give a booster (second shot) 3 weeks later.

- If soremouth (ovine ecthyma) is a problem vaccinate at least 10 days prior to entry in the feedlot. This will probably only be possible with lambs from your own herd as I would imagine most sheep producers in Iraq don't vaccinate their lambs for soremouth. If soremouth is not a problem then don't vaccinate as the live vaccine could accidentally be introduced onto your farm.
- Weigh each lamb and record the weights. In Iraq lambs are purchased as lots instead of individually. Be sure to keep record of the purchase price of the lot being weighed so that you will be able to determine profitability once the lambs are sold.
- Tag each lamb.
- Sort lambs into lots with similar weight and frame size. With lambs coming from only a few producers the variation in weight and size should not be significant.

Feedlot Design and Layout

Feedlot designs are simple in nature. The key is to create a series of alleyways, chutes, and holding pens where animals can easily be contained in order to weigh, vaccinate, and tag. This will simplify labor and provide less stress on the lambs. Always ensure that feed bunks stay clean. Any old, stale feed should be cleaned out of the feed bunks and water troughs should always be clean. Make a habit of cleaning water troughs at least weekly. Water is the most important nutrient for livestock. If clean water is not available at all times your lambs will go off feed (stop eating) and in the heat of the Iraq summer could easily dehydrate and die. Ensure shade is provided not only in the general feedlot area but over the feed bunks as well.

Chapter 3- Purchasing Feed

Next only to purchase price, feed prices will account for the bulk of the expense when finishing lambs. A good feedlot operator learns quickly what feed is available in their area and at what price it is being sold. They also learn to be creative in their feed selection. For example ground dates may provide as much energy, or even more energy, in the feed ration than the traditionally fed wheat bran. The goal is to find quality feed that will meet the nutritional demands of the feedlot animals at the lowest price possible. Lower daily feed costs net higher profits when the lambs are marketed and sold.

The most important item to remember when purchasing feed is to purchase high quality feeds in bulk when the prices are low and store them in your warehouse. When going to purchase feed all you need is a notebook, a list of nutrient values (Crude Protein and TDN/Energy), and a hand held calculator. With these tools you can quickly decide which feeds will provide the most nutrients at the lowest cost. Crude Protein and Total Digestible Nutrient (TDN) values for feeds can be taken from the livestock nutrition software you were provided. Crude Protein and energy values such as TDN can be found on the main menu under "Tab F, Feed Library" and then under Standard Feed Library. Record the Crude Protein and TDN values in your notebook for the various feeds you will be looking to buy.

Calculating nutrient costs (Crude Protein and TDN/Energy)

Straw appears to be a favored roughage among livestock producers in Iraq. From my interviews with livestock producers in Iraq their reasoning for feeding straw instead of alfalfa

hay is that straw is cheaper. It is true that straw is cheaper per ton than alfalfa hay but when you calculate the cost per kilogram of crude protein (CP) for straw and alfalfa hay you will find that feeding alfalfa hay will actually cost you almost half the price of feeding straw. Calculating nutrient costs is the simplest and most accurate method for determining the true costs of feeds. The following example will show you how to calculate the cost per kilogram of crude protein:

Let's say that barley straw is \$100 per ton. Barley straw has approximately 4% CP. Crude Protein values for feeds can be taken from the livestock nutrition software you were provided. Crude Protein and energy values such as TDN can be found on the main menu under "Tab F, Feed Library" and then under Standard Feed Library. Now let's take alfalfa hay at \$250 per ton. Alfalfa hay will be a minimum of 18% CP.

For the barley straw divide \$100 by .04 and this equals \$2500 per ton then divide \$2500 into 1000 (1000 kg in one ton) and you get \$2.50 per kilogram of CP. For the alfalfa hay take \$250 and divide by .18 and this equals \$1380 per ton of CP then divide \$1380 into 1000 (1000 kg in one ton) and you get \$1.38 per kilogram of CP for alfalfa hay. We now see that alfalfa hay is actually almost half the price of straw. There should never be a reason to substitute straw for alfalfa hay. Price can no longer be used as a reason.

The same calculations can be used to determine the nutrient cost for energy. The best way to do this is to calculate energy using Total Digestible Nutrients (TDN). The following example will show you how to calculate the cost per kilogram of energy (TDN):

Again let's say that barley straw is \$100 per ton. Barley straw has approximately 44% TDN. Now let's take alfalfa hay at \$250 per ton. Alfalfa hay will have a value of approximately 60% TDN.

For the barley straw divide \$100 by .44 and this equals \$227 per ton for TDN then divide \$227 into 1000 (1000 kg in one ton) and you get 22.7 cents per kilogram of TDN. For the alfalfa hay take \$250 and divide by .60 and this equals \$416 per ton of TDN then divide \$416 into 1000 (1000 kg in one ton) and you get 41.6 cents per kilogram of TDN for alfalfa hay.

Your first reaction will be that straw is what you will buy because according to this calculation for energy it is actually cheaper than alfalfa hay. This assumption would be incorrect. Again use common sense when feeding livestock. A finishing lamb needs a minimum of 63% TDN in their diet. Straw only has 44% TDN. There is no way that a finishing lamb could physically consume enough straw to meet the energy requirement of 63%. Combine this with the fact that the same finishing lamb has a Crude Protein (CP) requirement of about 10% CP and straw only provides 4% CP. Basically, you will be spending large amounts of money to feed a lamb that will eventually die or not gain weight because of the poor quality of straw. In addition, straw does not meet the calcium, phosphorous, or vitamin/mineral requirements for livestock. Alfalfa hay meets the CP requirement, comes close to meeting the energy requirement (little supplementation would be needed compared to feeding straw), and meets the calcium, phosphorous, and vitamin/mineral requirements. Remember you are feeding lambs in a feedlot for rapid gains in a short amount of time. For this reason you were trained on the nutrition computer software program to achieve a balanced ration that will give your lambs the most rapid weight gains in the shortest amount of time at the lowest cost.

When going to purchase grains the same type of calculations made for Crude Protein can be made for energy in the form of TDN. Forages like alfalfa hay are considered protein feeds so

therefore you would calculate the Crude Protein costs for forages. Feeds such as grains are energy feeds so you would calculate nutrient costs for grains based on TDN.

Example

Let's compare the cost between barley grain and wheat grain.

Wheat grain:

TDN: 88% Cost: \$350 per ton

Take \$350 and divide by .88= \$397 per ton then divide by 1000 (number of kg in ton) to get .397 or 39.7 cents per kilogram (cost of energy for wheat)

Barley grain:

TDN: 80% Cost \$300 per ton

Take \$300 and divide by .80=

Take \$300 and divide by .80= \$375 per ton then divide by 1000 (number of kg in ton) to get .375 or 37.5 cents per kilogram (cost of energy for barley)

You find that barley is cheaper than wheat so barley should be purchased. Simple calculations like this can be made between all energy feeds/grains to determine the most economical feeds for your livestock.

Chapter 4- Feeding

Lambs are efficient eating machines and can eat a large variety of forage and grains. When feeding your lambs you basically have two options. The first is to feed a Total Mixed Ration (TMR) where the forage, concentrate, salt, calcium, phosphorous, and other vitamins and minerals are all mixed together. The alfalfa hay will need to be chopped first and then mixed with the concentrate portion of the ration. With your feed mill you have the capability of mixing your feed in order to provide a TMR. When mixing, make the ration as coarse as possible. Do not grind the ration to a powder. The coarser the ration is better. Try to keep a 70% concentrate and 30% forage (good alfalfa hay) ratio for your ration. Keeping a 30% forage portion of the ration will decrease the chances of acidosis and urinary calculi as well as providing the much needed calcium, vitamins, and minerals.

The second option is to feed a diet of whole grain such as whole barley. With this you would provide alfalfa hay free choice, but do not put the alfalfa hay in the same feeding trough as the whole grain. Feed the alfalfa hay in a separate hay rack to avoid waste. You will need to provide a free choice salt, trace mineral mix as well. This should also be put in a separate feed box/trough and built so that the lambs cannot spill the mix. When adding salt to mixed feeds, add .5% to the complete ration. Loose salt and minerals, rather than block salt should be provided for lambs since they tend to bite at salt blocks rather than lick. Biting the blocks may result in broken teeth.

Which option you choose depends on your labor and equipment availability. Grinding and mixing of feed is an added cost that many sheep producers could avoid. Of all farm animals, sheep are best able to do their own grinding. With few exceptions they should be fed whole grain. Whole grain has a built-in roughage factor. Since cattle eat their food whole, they do

not digest whole grain well. Whole grain feeding of lambs increases feed efficiency, increases average daily gain, and lowers overall cost of gain.

Feeding a balanced ration that has been calculated from the nutrition software, provided to you, should bring an average gain of 300 grams per day. Obtaining this average daily gain will enable you to purchase 18 to 20 kilogram lambs and feed for them for 5 months to reach a market weight of 60 kilograms each. Lambs should be weighed once every month to determine average daily gains. Traditionally you have been weighing lambs every two weeks, but remember that every time you take lambs to be weighed they have the risk of injury and losing valuable weight. During the finishing phase of a feedlot program, an average feed conversion of 6 kg feed to 1 kg gain is assumed. Therefore, an estimated 60 kg of feed will be required to obtain a 10 kg gain in live weight (Duddy et al, 2007).

How many times and when to feed are important parts of a feedlot operation. Feed should be available at all times. This facilitates higher lamb growth rates, which is important to overall feedlot efficiency. It also helps to reduce the risk of digestive problems and 'shy feeders'. Where feed troughs are used, they may require twice-daily filling in order to keep the feed bunks full. According to research, those lambs given 24-hour access to a feed consumed more and gained significantly more than lambs hand-fed twice per day (Stanton and Swanson, 1992). Feed efficiency also improved significantly with continuous feeding.

Industry findings suggest that 5%–10% of lambs will not adapt to the feedlot situation. When percentages exceed this range, a careful review of feeding and management procedures is recommended. Remove 'shy feeders' from the feedlot. They may be sold, placed on pasture or a fodder crop or penned separately. It is not uncommon for the majority of 'shy feeders' to then gain weight, due to a reduction in social stress in their new environment.

Feed Mixing

If feeding a TMR, the mixed ration should look the same throughout the bunk or in the self-feeder. While inadequate mixing can be a common problem, you can also mix too long in a vertical mixer. Sorting out can occur due to differences in particle size and weight of the various feedstuffs. Ingredients that are added in small amounts (for example: vitamins and minerals) should be mixed with one or two buckets of grain before being added to the mixer. Roughage (hay) should be chopped before adding to the feed mix. The following is a recommended method of adding supplements to a vertical grinder mixer:

1. Add half the grain.
2. Add the supplement.
3. Add the rest of the grain.
4. Add the roughage.
5. Mix for five minutes at the feeding site to eliminate separation occurring during travel to the feeding location.

Rescheduling the use of selected equipment for peak demand periods to off-peak periods or manually shutting off some of the equipment with large motors can save charges. Be careful to avoid frequent starts and stops which can damage equipment.

Chapter 5- Feedlot Animal Health

Acidosis (Grain poisoning)

Lambs that are not accustomed to grain are prone to acidosis. Lambs eating relatively small amounts of grain, or pelleted ration with high starch content, can develop acidosis due to the production of high concentrations of lactic acid within the rumen. Lactic acid accumulation can cause distress, diarrhea and/or death.

Grain poisoning is most likely to occur when:

- lambs are being introduced to grain
- there is a sudden increase in grain intake (for example, following wet weather)
- there is a change of grain source in the ration

Gradual introduction of the grain content in the ration is essential if grain poisoning is to be avoided (see Tables 4 and 5). Loose droppings are an early indication of digestive disorders. If this occurs, maintain the ration at the existing grain level until droppings firm. Sometimes it will be necessary to drop back to the previous level of grain feeding. If the droppings develop a watery consistency, return to hay-only feeding and recommence grain introduction when droppings have returned to normal. Symptoms of acidosis in lambs may include scouring, abdominal pain, a sluggish and dehydrated or bloated appearance, and a characteristic arching of the back.

Treatment

Treating lambs suffering from acidosis is difficult and rarely successful, unless lambs are identified and treated within the early stages of developing the disorder. Lambs should be removed from feedlot pens and drenched with 60 g of Causmag (magnesium oxide) or 15 g of sodium bicarbonate in 1 L of water, in an effort to neutralize acids produced within the rumen. Alternatively, drenching with 10–20 mL of paraffin or light vegetable oil and/or dishwashing liquid will enable lambs to belch the gas and foam that has formed within the rumen during early stages of acidosis. Gas and foam can cause distension of the rumen, which restricts lung movement and frequently leads to death by asphyxiation. Affected sheep should be given hay until they recover.

Urinary Calculi

Urinary calculi or “water belly” is a common metabolic disease of feedlot cattle and sheep. The disease occurs when calculi (stones), usually comprised of phosphate salts, lodge in the urinary tract and prevent normal urination. Normally, phosphorus is recycled through saliva and excreted via feces in ruminants. High grain, low roughage diets decrease the formation of saliva and therefore increase the amount of phosphorus excreted in the urine.

The primary cause of urinary calculi is feeding concentrate diets which are excessive in phosphorus and magnesium and/or have an imbalance of calcium and phosphorus. Lack of water and water sources that are high in minerals are also contributing factors. Affected animals show colicky pain such as kicking at the belly, treading with their hind feet, and

switching the tail. Attempts to urinate are frequent with straining and grating the teeth. Urine is not able to pass, and is often blood tinged. Worst case scenario is that urine is completely absent. When the obstruction is complete, the urethra or bladder ruptures. Rupture of the bladder can cause immediate pain relief but urine accumulating in the abdomen (thus the name “water belly”) causes a toxemia and death in about 48 hours.

Treatment

Severe cases need to be treated by a veterinarian. The best treatment is of course prevention. Be sure to include good alfalfa hay in the ration. In addition, roughage will increase salivation and rumination which will increase the amount of phosphate excreted in the urine. Also always include salt as part of the ration and make sure there is always clean water available.

Bloat

Bloat occurs when rumen gas production exceeds the rate of gas elimination. Gas then accumulates causing distention of the rumen. Bloat can be a medical emergency, and timely intervention may be necessary to prevent losses. It is a common cause of sudden death. Bloat is caused by animals feeding on green lush pastures or high quality legume hay when they are not accustomed to it and/or feeding high concentrate diets.

Treatment

Simple passage of a stomach tube may be effective at relieving free gas bloat. Inserting a needle into the abdomen is a life-saving procedure that should only be attempted as a last resort and performed by a veterinarian.

Enterotoxemia, types C & D

Enterotoxemia, or overeating disease, is a major killer of lambs from shortly after birth through the entire feeding period. It is characterized by acute indigestion, convulsions and other nervous system signs, colic, and sudden death. It most commonly affects single lambs, nursing ewes that are heavy milk producers, and feeder lambs on high energy diets. With proper feeding, management, and vaccinations, the disease can be controlled.

Enterotoxemia is caused by a bacterium called *Clostridium perfringens*. This organism is universally present in soil and manure and is a common inhabitant of the digestive tract of all animals. It normally inhabits the lower digestive tract and causes no harm to the animal. *Clostridium perfringens* thrives on starch and sugars that are normally digested and metabolized higher in the digestive tract. When a lamb overeats, undigested starch and other carbohydrates provide a medium that allows the *Clostridium perfringens* organism to grow and increase. It also enhances the organism’s ability to produce several very potent toxins that are released into the intestinal tract and absorbed into the animal’s system. The result is sudden death. Healthy, rapidly growing lambs are particularly susceptible to enterotoxemia.

It is a common error to assume that all causes of sudden death in lambs are due to enterotoxemia. There are several causes of sudden death including white muscle disease (selenium deficiency), acute pneumonia, and others. So, a careful diagnostic effort should be made. Enterotoxemia rarely causes death in adult sheep. Prevention of the disease is essential. This is accomplished in several ways. The most effective method of preventing enterotoxemia in lambs is to maintain a steady intake of feed. Gradually adjust or increase feeder lamb rations

containing more than 50 percent concentrate. Avoid sudden changes in ration ingredients, especially those affecting palatability. Prolonged periods of hot weather often adversely affect the lambs' appetites. When weather suddenly cools, the lambs may eat heavily with some suddenly dying. Water deprivation will drastically reduce feed intake. When water is reintroduced to the lambs, they will often overeat and have problems. A steady source of clean water is very important in preventing this disease.

Treatment

When an outbreak occurs in feeder lambs, it is usually advisable to increase the amount of roughage in the ration for a few days.

Laminitis (Founder)

Laminitis is similar to "founder", an ailment commonly found in horses. Affected animals appear lame and are hesitant to stand or move unless forced to do so. A form of acidosis, laminitis is caused by the release of toxins within the bloodstream following consumption of excess dietary energy or protein. Affected lambs may recover within several days if action is taken quickly.

Treatment

The best treatment is to provide reasonable-quality hay and/or removal of affected animals from the feedlot will facilitate recovery.

Vaccines

The use of vaccine to protect against costly losses from disease in the feedlot is an essential part of good overall lamb management. These vaccines must be handled and stored properly if they are to be effective. Good handling and storage procedures will ensure that you have few problems. The following are recommendations for proper vaccination handling:

- Buy vaccines from dealers who have good storage and handling practices. Purchase vaccines from quality companies preferably from companies from the U.S and Europe. Vaccines from these countries are available in Iraq.
- After purchase, store vaccine in a cool, dark place such as a refrigerator. Avoid heat and direct sunlight. Vaccines cannot stand warm temperatures and light. Care should be taken to ensure that the vaccine does not freeze, because this can ruin most vaccines.
- Vaccines should be properly stored until they are ready for use. Expose only what vaccine is needed or will be used in about an hour. If there are several animals to be processed, keep vaccines in a cool insulated container and take them out as needed.
- Alcohol or any disinfectant applied to the needle between animals can kill a modified live vaccine if only a drop remains in the needle. For this reason, when you use a modified live vaccine refrain from disinfecting the needle between animals. You should use disposable needles.
- If you are using a syringe and needle to make the diluent transfer, use a clean syringe for this purpose to avoid contamination of the entire vial with the syringe you are vaccinating with. You should also maintain a clean needle for withdrawing vaccine from the vial, avoiding the possibility of contamination by using the needle you are vaccinating with.

- It is important to read and follow all label directions on the vaccine. Proper handling and storage of vaccines will enhance the development of a strong immunity to the diseases for which you are vaccinating.
- Live and killed vaccines are both available and each has distinct advantages and disadvantages. Modified-live virus (MLV) vaccines tend to stimulate protection sooner than killed vaccines and may do so in a susceptible animal with one dose. MLV vaccines are generally cheaper than killed virus vaccines but require a normal immune system to work. Killed vaccines usually require at least 2 doses 3 to 4 weeks apart for optimal protection but are free from potential contaminants such as free live virus. Killed virus vaccines generally do not cause the immune suppression sometimes seen with live vaccines and are usually safe in pregnancy. Poor vaccine handling techniques can kill modified-live vaccines. Any vaccine can become contaminated and make them dangerous to use.

Marketing

Feedlot operations are a business. The end goal is to market and sell animals and make a profit in order to maintain a viable business. A good feedlot operator knows every cost incurred during each phase of the feedlot process. Costs or expenses have to be known in order to determine if a profit has been made once the lambs have been sold. Commercial lamb buyers are knowledgeable of costs and returns, skillful buyers and sellers, and keenly aware of market trends and lamb prices. Lambs from USAID-*Inma* sponsored feedlots are sold to a variety of buyers including local butchers, commercial lamb buyers (middlemen), and private individuals especially during holidays and religious festivals.

From my visits to the USAID-*Inma* sponsored feedlots in Iraq I have determined that most feedlots are well below animal capacity. This is even more pronounced in the lamb feedlots. I have been told that lamb feedlots are below capacity because of the lack of capital to purchase lambs and/or availability of lambs.

- **My recommendation** is to look at custom (contract) feeding during periods when your feedlot animal numbers are low.

Custom Lamb Feeding

Custom lamb feeding is the feeding of lambs for a fee, without taking ownership of the animals. USAID-*Inma* sponsored feedlots are perfect for custom feeding. Your feedlot is the most modern in Iraq and you and your staff have received the best technical training available. Through custom feeding, you “sell” the use of your facilities, services and knowledge to other lamb producers, usually with a profit for everyone involved.

Custom feeding contracts should always be detailed and in writing, for a good understanding is the best way to avoid a misunderstanding. Also contracts should be fair to both parties (both the feedlot owner and the owner of the lambs). There are different types of custom feeding contracts. The services provided vary from feedlot to feedlot and according to the type of contract. In some instances, the services may be so complete that the customer never sees their lambs. The feedlot operator may purchase the lambs, feed them, market them, and send the customer/client a payment for the balance, after deducting input costs and custom feeding charges. Any type of contract can be worked out as long as both parties are comfortable.

Usually, contracts with fixed charges are the most satisfactory and the most common, mainly because there is less room for misunderstanding.

Although there are many types of custom lamb feeding contracts, and many variations of each kind exist, most of them can be classified under one of the following types:

1. Feed cost plus daily fee per head.
2. Feed cost plus a percentage markup.
3. Feed cost plus a daily fee per head and percentage markup per ton of feed.
4. Agreement to purchase contract.
5. Payment for weight gained.
6. The incentive basis contract, meaning the higher the gain, the higher the charges.

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