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Beef Feedlot Management Guide



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2008



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Introduction

Fattening beef cattle in a feedlot management system is an effort to achieve a consistent supply of quality beef that meets market needs for premium quality. It allows producers to maintain production when lush pasture is not available, to achieve rapid growth with a balanced ration of grains and alfalfa-grass dry hay, to generate a year round cash flow, and to value-add ration components. Through good management, preventative veterinarian practices, and balanced rations, the cost per kilogram of weight gain can be less than the traditional feeding methods of feeding calves after weaning in Iraq.

Economic Considerations

It is important to do a careful financial analysis to assess the viability of a beef feedlot before committing resources to an intensive feeding system. You need to pre-determine the profitability of a beef feedlot program. You need to know the feed requirements for a specified daily rate of gain, the cost of that feed daily, the market weight you are targeting, the estimated market price when finished, and the break-even costs to achieve a return on capital investment.

Feed Cost

As most beef steers require 12-14kgs of feed to produce 2kgs of live weight, ration cost are a major issue within a feedlot operation. The amount of feed required will depend on:

- the weight and health of the starting calves
- the quality of feed and a balanced ration
- the genetics of the steers
- the feed conversion ratio
- the target market weight

Most steers will need to be fed within a feedlot for 9 to 11 months when feeding for growth rate is the primary goal. Survival feeding will require a much longer and more expensive cost per kg of weight gain. A diet of straw and poor pasture will result with very little or no weight gain. If quality feed is not available, do not get into the beef feedlot business.

When you are buying feeds consider quality, continual availability, and price. The major feed components especially alfalfa-grass hay should be



Feed grains

tested for energy and protein. Grains like barley or wheat do not vary in feed nutrients much, but hay can lose nutrient value by poor post-harvest methods, or waiting until the alfalfa is in full bloom.

The protein in hay is in the leaves. Look for lots of leaves in alfalfa hay. Contract the hay purchases and grain purchases for both price and quality with a reputable feed mill, feed depot, custom hay maker, or large hay producer with the equipment to properly post-harvest hay.

Buying Quality Alfalfa-Grass Baled Hay

Before contracting a hay supplier, learn their harvesting and handling methods. Alfalfa-grass fields should be cut when the alfalfa is just starting to bloom. With the hot dry weather in Iraq, the green hay should be mowed into a windrow with a mower conditioner, and left in the windrow without disturbing it until it is 15 % moisture. The time it takes to get to that level of moisture will depend on the temperature and humidity. If it is drier than 10%, the baling process will lose too many leaves. During hot dry summer months, baling might have to be done at night or early morning. The hay provider needs to have the training and equipment to make high quality hay. Alfalfa-grass hay will provide the lowest cost protein available in Iraq, and protein is an essential nutrient for rapid and efficient weight gain.

Buying Grain

Barley, wheat, and corn are good economical sources of energy. All three are very close to each other for energy feed value as long as those grains are free of dust, molds, and toxins. As shown in Table 2, wheat is higher than barley for energy, however barley's energy is easier for steers to utilize and it is higher in protein. Generally, the prices of these three grains are similar.



Cattle feeding in a feedlot

Fed in the proper balanced ration, barley, wheat, or corn and good alfalfa-grass hay will provide the nutrients needed to get a healthy steer to gain 1kg of weight or more per day depending on hay quality. If the alfalfa hay is made at full bloom or latter, or lost a lot of the leaves, then expensive protein supplement will need to be added to the ration increasing the daily feed cost.

Risk

Starting a feedlot involves financial risk. Animal deaths, disease, poor weight gains, and unexpected changes in feed cost or beef market prices will affect the economic success of the

venture. When budgeting, always include some risk factors, because problems are part of running a feedlot. Financial risk can be minimized by ensuring:

- An adequate supply of quality feed and feed storage on the feedlot site large enough to keep several months' supply on location.
- Contract feed supply for grain and hay
- Sound feedlot management
- Contract in advance the weight, age, and price for the finished steers

Capital expenditure

A beef feedlot needs to be built with as little capital outlay as possible. Well-designed facilities can be built, or existing facilities may be modified to provide a suitable feedlot. Adequate shade and water are essential in Iraq. Even with the best of feed rations, beef steers will not gain weight if adequate shade and water is not provided.

The biggest capital outlay when establishing a feedlot will be for feed troughs, hay racks, fencing, gates, weighing and treating shuts, loading ramps, and shaded areas that are sufficiently sturdy to retain large 400kg or larger animals. The hay storage facility need only be a roof with no sides, but the grain storage building needs to be rodent proof. There needs to be storage bins near by for composting manure collected

daily from the feedlot for latter sale as organic fertilizer. The feed storage should be near the feed trough and hay rack to save time and labor getting the feed to the cattle.

Economic considerations

- Every effort needs to be made in purchasing feeder calves to select healthy animals and should be done with an experience veterinarian.
- When purchasing feeders for a group, select similar sized animals. Smaller animals cannot compete at the trough with bigger cattle.
- Ensure an adequate supply of high quality alfalfa-grass hay, and feed grains.
- When budgeting for the feedlot, figure on 2-3% of the animals will be culled for low performance or die.

Example (beef for 1 year)	Iraqi Dinars	USD
Cost of 50kg calf at \$3/kg	180,000	150
Cost of feed		
3kg alfalfa hay/day at \$.24/kg for 350 days	302,400	252
3kg barley grain/day at \$.24/kg for 350s	302,400	252
Other costs	288,888	240
Total Cost	1,072,800	894
Sale of 400kg steer at \$3/kg	1,440,000	1200
Profit	367,200	\$306.00

Table I - Example of a preliminary budget

Building a Feedlot

Because of the narrow profit margin in Feeder beef feedlots, designing and building a feedlot must take into consideration both construction cost and a design to make the most use of the labor.

Site

Select a well drained site with the proper slop away from the shade shed, the feed bunk, and hay rack with easy access to water. Place the hay storage cover and grain storage near the feed bunk, yet easy access to the road for the convenience of the hay and grain delivery. Depending on the location in Iraq, the rainfall is very light so there should not be much mud problems, but when rain does fall it could be heavy at times.

Size

Feedlot size is determined by the number of steers to be penned. As a guide, provide each steer with a minimum of 24 square meters of open space, and 10 square meters of shaded area. Additional space will reduce social stress among the animals. The *Inma* beef feedlot project has suggested

eight lots of 50 steers each totaling 400 steers. Each lot will need 500 sq m of shade, and 1,200 square meters of open space for 50 steers.

Water

A plentiful supply of cool, clean, good-quality water is essential. Water should be in a trough and off the ground, to aid in keeping it clean and free of manure and urine. This point cannot be overemphasized especially in the hot dry temperatures of Iraq. Poor-quality water - including contamination by feed, dust, and feces - leads to a reduction in water intake, and slower rates of gain.

Water troughs should be placed in a separate area away from the hay racks and feed troughs. Raise them about 70cm above the ground with a 3m cement base on the ground around the trough. That will allow ease of daily manure removal and avoid a mud problem near the water. The steers will spill water. The trough should be large enough to accommodate easy access for the number of steers to be housed. It is recommended that the water trough should be 2.5 to 3m long and at least 60cm wide per 50 head. The water trough should be cleaned at least once a day and more often if it becomes contaminated with manure or other dirt.

The average intake of water per steer per day is about 50

liters (2,500 liter per day for 50 steers, and 20,000 liters per day for 400 steers). However, in Iraq's hot summers; the intake will be larger. A dependable water supply is essential.

Feeding equipment

Alfalfa-grass hay must be available at all times. This will facilitate higher rates of gain per day which improves overall feedlot efficiency. It also helps to reduce the risk of digestive problems. The hay and grain should be fed separately, with feed troughs for grain and hay racks for hay. Feed grain troughs will require twice-a-day filling. The hay rack should never run out of hay. A shade roof should be constructed over the hay rack and grain trough to protect the steers from the sun during the hot time of the year. Animals will stand and eat more during the hot days if shade is provided. Weight gain is in direct proportion to feed eaten.

Troughs or Feed Bunks

Allow a minimum of 25-30 cm of trough space per steer, and place it at the opposite end of the feedlot from the shade shed. *Inma* recommends that the feed bunk extent the entire width of the lot or 20 m long for 50 steers. If more than 50 head are housed together, add 25 cm per head. It needs to be long enough so all animals housed in the lot can eat grain at the same time.

The grain mix will be fed twice a day. Several configurations are possible to keep the feeders from standing in the feed trough or exiting the feed lot. Steel pipes or strong wood head openings are recommended. The pipes can be vertical or slanted but should be adjustable so the space between can be changed for bigger or smaller animals.

The pipes through which the animals eat at the bunk need to be about 25 cm apart and adjustable (cannot be welded!). Or parallel pipes can be used that are close enough so the animals can get their head through but not escape. The manger should be made of cement.

Hayracks

Hay can be successfully fed in hayracks within feedlot pens. Simple racks can be made from wood or pipe. The hayrack should be off the ground at least 60 cm with a tray at the bottom to reduce trampling and waste. A shade roof should also be above the rack to encourage day time eating. The hay rack can be in the pen where steers can consume hay from both sides or along the fence where they can eat from only one side. It needs to be twice as long if feeding from one side. For 50 steers, the hay rack should be 10 m long if along the fence line, and if in the pen where steers can feed from both sides, 5 m long. The distance between vertical

pipes should be about 12 cm. Allow extra length to lessen animal social stress.

Hay and grain should not be fed in the same trough unless the hay is ground and mixed with the grain, or what is called Total Mixed Rations (TMR). As beef feedlots expand in size, a total mixed ration system mixer might be considered. A 400 steer feedlot is not big enough to justify the cost of a TMR system.

Selecting Feeders

Weight and Condition

Economic success is more likely in feedlots with healthy calves that have just been weaned and disease and parasite free. Be especially vigilant for pinkeye, and lameness. Live weight information at regular intervals is important and a fundamental requirement for efficient management so the feedlot must have scales. Use them when selecting lambs, and to monitor performance over time. Scales need to be easily accessed so weighing can be done frequently. If selecting bull calves that will be housed together, select those calves that are similar in size and weight. That will provide a low-stress feedlot environment resulting in fewer problems.

Preparing the Bull Calves for a Feedlot

To make a profit in a beef feedlot two management procedures are high on the list; 1) prepare calves properly to enter the feedlot, and 2) prepare them for sale.

Veterinarian Check and Animal Identification

All animals must ear tagged, branded, or painted with an

individual identification number. This is essential for proper herd management. All animals need to be weighted on the feedlot scales regularly to track weight gain of each animal, and feed conversion rate. A herd record keeping book is available. The feedlot design needs to have walkway along the side of the lot where animals must walk through in single file. Scales with gates on both sides must be built into the animal walkway. This will allow individual animal weighing to record weights, and for veterinarian treatment needs.



Calves should be clearly identified with an ear tag.

An isolation pen away from the rest of the feedlot, and not sharing the same fence is needed to put all new animals into for the first 3 weeks. That is to avoid introducing any new diseases to the rest of the feedlot animals. While in the isolation pen the veterinarian must check all calves for pinkeye, lameness, and any other diseases, and treat all animals with a broad-spectrum de-wormer.

Calves should be vaccinated for any known cattle diseases that are common in the region where the calves were bought, and given a shot intramuscularly with vitamins A, D,

E, and B12. The neck or ear area is the best site for vaccinations so damage is not done to the carcass. The calves should also be castrated at this time.

This procedure is needed for meat quality in the finished steer, and for safety of workers. A pen full of healthy bulls can be very dangerous for workers. A castrated bull becomes a steer. Banning the bulls at purchase time is preferred to surgical castration.

Feed Ration

The feed ration will contain grain, forage, and necessary minerals such as calcium, phosphorous, salt, and trace minerals. Additional additives may be needed to improve steer weight gain, depending on the quality of the grain and hay. Feed contamination by moulds, dust or rodents is a common reason for low dry matter intakes and poor performance.

Key Ingredients

Steers need three key ingredients from the ration – energy, protein, and fiber – in order to grow to market weights as economically as possible. In Iraq, the most economical sources of energy are grains like barley, wheat, or corn. These grains also provide some protein but are primarily fed for energy. Protein in the ration can come from soybean oil meal, or other oil seed meals, and alfalfa-grass hay. On a cost per kilogram of protein basis, early cut alfalfa-grass hay dried and baled properly is the lowest cost protein for steers presently in Iraq. In fact top quality alfalfa-grass hay and barley grain fed in the proper balance will provide most of the energy, protein, fiber, minerals, and vitamins needed for growing steers to market weight profitably. (See Table 2 for energy, protein and fiber levels of common feeds in Iraq)

Fiber

Beef cattle are ruminants; therefore they also need some fiber. Straw is a common feed fed in Iraq. It is high in fiber, but very low in energy and protein, and is not a feed. Straw should be used for bedding or left in the field and plowed down to build soil structure. Alfalfa-grass hay also has fiber but at much lower levels. So a well balanced ration of barley, and alfalfa-grass hay not only provided most of the protein and all energy needed but also all the fiber needed. Too much fiber limits Dry matter intake, and stunts growth.

Energy

Energy is provided through the breakdown of carbohydrates, protein and oils/fats within the rumen and small intestine. Starch is the most common form of carbohydrates and found in cereal grains. Feeding excess protein can be used to provide additional energy for feedlot steers; however, it is less efficient than starch digestion.

Oils/fats are energy-rich forms which provide as much as 2.25 times the energy of starch. Unfortunately, levels exceeding 7% in the ruminant diets can lead to a decrease in rumen efficiency.

Protein

Protein is necessary for muscle development and appetite. Inadequate protein can lead to a reduction in rumen bug numbers and activity, a reduction in intake, and slower weight gains. Crude Protein (CP) requirements vary according to the rations energy content and the steer's age and live weight. Young lightweight calves require higher levels of protein at any given energy intake due to their higher requirement for muscle development.

Urea is a cheap form of non-protein nitrogen that the rumen microbes are able to turn into protein for the steer's use. Urea can be included in the ration but not to exceed 1%-2% of the ration and must be mixed into the grain evenly. Calves under 100kg of weight should not be fed urea because their rumens are still developing. If urea is used in the ration, it should be introduced slowly over 10 to 14 days, and must be evenly mixed into the ration. Urea is converted to crude protein by first being converted to ammonia by the rumen microbes. A sudden increase of ammonia can cause death.

Key ingredients	% C P	NEm	NEg	%ADF	% NDF
Barley	13.5	2.07	1.41	7	19
Wheat	11.3	2.20	1.52	4	14
Corn	10.0	1.94	1.30	3	9
SBOM	49.0	2.07	1.41	10	15
Alfa-G Hay	18.0	1.32	0.75	31	42
Straw	3.6	0.75	0.22	54	85

Table 2 – Energy, protein, and fiber in common Iraq feeds

SBOM = Soybean Oil Meal; **%CP** = Percent Crude Protein; **NEm** = Net Energy for maintenance; **NEg** = Net Energy for growth; **%ADF** = Percent Acid Detergent Fiber; and **%NDF** = Percent Neutral Detergent Fiber. Energy information on the feeds is listed as Magi calories per kilogram. (Note that straw is very low in all important nutrients and too high in fiber)

Minerals

Steers need a range of minerals to maintain good health. Three are important in Iraq calcium, phosphorous, and salt. Most cereal based rations provide enough of the trace mineral needed with the exception of calcium phosphorous and salt. However, alfalfa hay is high in calcium but low in phosphorus, and when that is part of the ration, calcium does not

need to be feed however phosphorous might need to be added to the ration. So in the beef feedlot project salt must be provided and phosphorous might need to be added. In the *Inma* sponsored feedlot project, the hay and grain feed will be tested for mineral content. Calcium, phosphorous, salt, and trace minerals will be added to the grain mix to balance the needs not provided by the hay and grain. Loose ground salt available free choice must also be provided in the feedlot. Salt blocks will not provide the salt needed. A steer would have to stand there all day and do nothing but lick salt to get enough sodium.

Vitamins

Vitamins will be added to the grain mix in small amounts if needed, however, it is recommended that the calves be given shots of vitamins A, D, E and B12 when they first come into the feedlot in the neck or ear area. High quality alfalfa-grass hay will help to correct many mineral and vitamin deficiencies.

Health and Disease

There are numerous health and disease issues commonly found within a feedlot system. Many are preventable, through vaccinations for common diseases (follow veterinarian's recommendations), vitamin shots when entering the feedlot, proper balanced feed rations, and good daily management.

To follow are some of the more common health and/or disease issues found within feedlot systems. The local veterinarian should assist with the diagnosis and management of all health and/or disease related issues. This pamphlet will focus on preventive management that will control or eliminate these problems.

Animals Going Off Feed

Calves that are not accustomed to grain and started on grain too fast are prone to going off grain. This is most likely to occur when:

- Calves are being introduced to grain
- There is a sudden increase in grain intake
- There is a sudden change of grain in the ration

- When animals are sick

Gradual introduction of the grain content in the rations is essential when calves first come into the feedlot. Loose droppings are an early indication of digestive disorders. However, this problem could occur at any time during the fattening process. Every steer in all pens should be observed twice a day to catch problems early. If loose droppings are observed, stop increasing grain for a few days until they firm up again.

Lameness

Sore feet will cause animals to go off feed. If it hurts to walk, they will not get up and walk to the hayrack or feed bunk, and will not compete with the healthy animals for grain. Daily observation of the animals is important. If an animal shows the slightest limp, the vet must check their feet for bursas, or foot rot. The earlier a foot problem is seen, the quicker the animal gets back to gaining weight. If you wait until an animal is walking on three legs before treatment, you will have lost all your profit on that animal.

Pinkeye

Pinkeye is common in feedlot cattle, and must be detected and treated early before the animal goes blind. Blind cattle

cannot see to find feed or water. Daily observation is essential. The problem is easily detected early with watery eyes. In the advanced stage, the eyes turn white in the pupil. At that stage, the disease can be stopped, but eye damage has already occurred.

Most of the diseases and deficiencies can be prevented through good feeding and management procedures. Animals getting a ration that provides all the protein, energy, minerals, and vitamins needed have much more resistance to diseases than poorly fed animals.

Starting to Feed

Rations used for feedlots increase in volume or weight as the steers gain weight starting with calves that weigh 50 to 100kg, and finishing with steers weighting 400 or more kilograms.

- The starter ration allows the weaned calves to become accustomed to the grain mix and the alfalfa-grass hay.
- The alfalfa-grass hay should be tested by a forage lab to determine the protein, energy, vitamins, and minerals contents. *Inma* has access to a forage laboratory. From those test, a grain mixture is developed to provide the additional nutrients needed to gain 1kg of body weight or more per day.
- Alfalfa-grass hay must be available 24 hours a day in a hay rack in each pen.
- The grain mixture will be fed twice a day, early morning and late evening.
- The amount will be set periodically as the animals gain weight. (See Table 3)

Each steer should be weighed twice a month and the weight

recorded. To do that each calf must be identified with an ear tag or other method of identification the first day at the feedlot, and that information recorded in the herd record-keeping book. From that information of bi-monthly body weights the manager can track each animal and the whole pen to see if the expected rate of gain is being achieved. If not the problem must be found. If the expected rate of gain is not being achieved or if one or two animals are not keeping up with the rest, it could be for the following reasons:

- The balanced ration or grain mix is not correct.
- The feed mill is not putting the proper amounts of protein or energy in the grain that was ordered.
- The employees are not feeding the amounts of grain that they should
- The hay rack is not full all the time
- The animals are not genetically capable of gaining weight at the expected rate. If that is the case, the amount of grain needs to be reduced. If it is just one individual, that animal needs to be removed from the lot.
- There could be a disease or parasite problem and the animals need to be checked by the veterinarian and treated.

It is critical that good quality alfalfa-grass hay is available in the hay rack 24 hours a day so the steers can eat when ever they want. As the animals gain weight, they will eat more

feed each day:

Animal weight in kg	Grain Fed / head/day
50 to 100	gradually increase grain until eating 1.75kg / day
150	2kg
200	3kg
250	3.5kg
300	4kg
350	4.5kg
400	4.7kg

One Ton Grain Mix when alfalfa-grass hay is available 24 hours a day

Grain schedule	
Cracked, rolled, or course ground Barley, corn, or wheat	995.02kg
Ground white salt	1.66kg
Vitamins A, D, & E	1.66kg
Mineral Mix	1.66kg
Total Tone batch	1000.00kg

Table 3 – Suggested grain schedule for animals as they increase in weight and having high quality alfalfa-grass hay freely available 24 hours a day

The mix is only suggested if high quality alfalfa-grass Hay is available 24 hours a day. The hay will provide the protein and most of the minerals needed for growing steer so they can gain 1kg of body weight per day. If straw or poor quality hay or pasture is fed, then expensive protein supplement must be added to the grain mix greatly increasing you feed cost. If the protein requirements are not met, animals will gain at a much slower rate, at a much great cost per kilo of body weight gain.

Manure Management Plan

The Feedlot Project will include both beef cattle and lambs in separate operations. Each lot will when at full capacity include 400 head of steers, and 400 lambs. All animals will be fed balanced rations for maximum profitable weight gain per day. Besides the production of premium beef and lamb for the public, these lots will produce a valuable by-product, manure. The manure management plan for the feedlots will include: 1) daily collection of manure; 2) composting of the manure; and 3) distribution of the compost to local grain and alfalfa-grass hay growers. Cattle manure is a low cost organic fertilizer that will provide plant nutrients, improve soil microbes, and improve organic soil structure, but can cause environmental problems if not properly stored or applied to the crop fields.

Because of the low average rain fall in Iraq (2 – 8 cm) and the sandy soils, feedlot runoff will not be a problem when manure is manually removed on a daily basis. However, the manure storage area (two compartment composting center) will have a concrete floor and wood or concrete sides to retain any runoff.

The processed compost will be delivered and sold to local grain growers at planting time, and to alfalfa-grass hay growers for topdressing the hay fields after harvest. This service could be provided by the feedlot owner or a private contractor with a manure spreader and tractor. The manure management plan would work well with alfalfa-grass hay and feed grain projects located near the feedlots. This will be an excellent opportunity to demonstrate an environmentally friendly nutrition management cycle between plants and animals.

Operational Procedures

- Manure will be removed each day manually with shovels and carts to the composting bens.
- The largest amount of manure droppings will occur near the grain bunk, hay rack, and water supply therefore a concrete pad is needed in those areas.
- The two part storage bens are needed to properly mix and age the compost.
- The aged manure compost will be loaded by hand onto a manure spreader and delivered to the fields at planting time or top dressed on hay fields after harvest.
- Soil testing will be done in advance of delivery to determine the amount of compost needed.
- Soil testing is also required to make sure that over ap-

plication of compost do not occur.

Statistics

The steer and lamb manure production will vary based on size of the animals, water supply, and feed quality and amount. Properly fed animals produce high nutrient value manure. These statistics are projections based on animals receiving proper nutrition and care.

- Average daily production of manure per steer - 10kg
- Production per day for 400 steers - 4 tons
- Average daily production of manure per lamb – 3kg
- Production per day for 400 lambs - 1.2 tons
- Projected manure production from steer feedlot per year – 1320 tons
- Projected manure production from lamb feedlot per year – 396 tons
- Each ton of manure on average will provide 10kg nitrogen, 11kg phosphorous, and 15kg potassium
- Compost storage area needed for steer feedlot – 2 storage areas for 480 tons each
- Compost storage area needed for lamb feedlot – 2 storage areas for 144 tons each

Feedlot Construction and Equipment Needs For the Manure Management Plan

The feedlots will be dirt lots with concrete surfaces only near the feed bunk, hay rakes, and water supply. Because of the low average rain fall in Iraq (2 – 8 cm) and the sandy soils, feedlot runoff will not be a problem when manure is manually removed on a daily bases.

- Beef feedlot for 400 head – 8 pens for 50 head each.
- Lamb feedlot for 400 head – 4 pens for 100 head each
- Each pen will be 600 sq meters or more plus a shade area.
- A concrete pad 3 meters wide will extend out from the feed bunk, hay rack, and water supply.
- Compost storage area needs to be divided into two separate storage areas that will hold 4 months supply of manure compost each (480 tons each – beef, 144 tons each – lamb).
- The two compartment compost storage area must have a concrete floor and side walls and a dividing wall.
- The compost storage area must be elevated 15 cm above the surrounding ground.
- Tractor and manure spreader

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