

GOAT





Meat Processing Toolkit



GOAT

1.-Goat Meat production - General Information

There are several goat breeds that have good potential for meat production. Generally, there have been limited planned selection and breeding programs carried out by animal scientists to improve rate of growth and carcass composition of goats. As a result, many goat breeds deposit less intramuscular and subcutaneous fat. In the past, domesticated meat animals were selected for heavier mature weight and greater rate of gain. Selection for such parameters usually resulted in undesirable characteristics because some of the animals had not only gained weight faster and were heavier at maturity, but also had more subcutaneous and intramuscular fat. Since consumers currently prefer leaner red meat, the livestock industry is making significant changes to satisfy these demands. Within the last 20 years, the pork industry has shifted from the lard to bacon type pig, resulting in a marked decline in fat (from 25 to 18%) and an increase in the protein content (from 17 to 20%) content of lean pork.

Goat meat has unique attributes which will be beneficial to the present day consumer. Goat meat has 10% more lean carcass than cattle. At the same time the fat content is lower by 47% than beef. These qualities of the goat meat need to be emphasized so that the general public can become aware of this useful product.

Fast food restaurants have started featuring poultry, fish and lean beef products, which seem to be gaining popularity. Lean goat meat could be featured as a "chevon super deluxe" which may attract a segment of the population with a concern for saturated fat and cholesterol content of their diet. Lauric, myristic and palmitic acids are saturated fatty acids and their concentration is not appreciably different in goat compared to ham. These acids elevate plasma cholesterol level and are known as hypercholesterolemic. Stearic acid, on the other hand, is another saturated fatty acid which is nonhypercholesterolemic. Further, dietary cholesterol levels influence serum cholesterol which is one of the factors contributing to coronary heart disease. Cholesterol content of goat is similar to that of beef, pork and chicken but much lower than some dairy, poultry products and some sea food.

The optimum amount of rest required by meat animals before they are slaughtered depends on the climate, the distance they have travelled, their method of transport and their general health. In some countries, where animals are auctioned at stock yards before they are taken to an abattoir, the rest periods are sometimes inadequate.

There are several criteria for a good slaughter method:

- (1) animals must not be treated cruelly,
- (2) animals must not be unnecessarily stressed,
- (3) exsanguination must be as fast and as complete as possible,
- (4) damage to the carcass must be minimal.

And the method of slaughter must be :

- (5) hygienic,
- (6) economical,
- (7) safe for slaughtering workers.

2.-Husbandry and Slaughtering Processing

Goat Husbandry and Slaughtering Processing

Ante - Mortem Concerns



Post - Mortem Concerns



2.1-Ante - mortem concerns

Goat Ante - mortem concerns



A.-Goat Husbandry

Goats should be stocked at the rate of five to six adult does to one animal unit equivalent. Meat goats must depend almost solely on forage to meet their nutritional needs. A carefully planned forage program can enhance growth and performance of goats. A good, thought-out, rotational-grazing program can improve pasture production and help control internal parasites. Supplemental grazing in stubble fields, corn fodder, wheat pastures, or winter rye can be used to either extend the grazing season or to boost required nutrient levels. Goats also complement both sheep and cattle in marginal grazing lands. Goats are considered excellent browsers and consume a higher percentage of brush and other less desirable plants. This allows goats to maximize the use of marginal pasture land as well as improved forage production systems.

Adequate space is required for the goats to eat, drink, rest, sleep and move. In addition, there should be enough space for the staff and equipment to provide feed and water, manure

removal, medical treatment and other husbandry procedures. Furthermore, provisions should be made for maintaining and repairing the equipment used in the many aspects of effective husbandry.

Plans should also be made for delivering feed and water and for removing manure on a temporary basis when the regular equipment fails or is shut down for repair. At all stages, goats should be handled with care, gentleness and patience. Training of employees and family members to properly handle goats is very important.

To have a good weight carcass yield it is need to do the right choice of breed to be reared. An analysis technique usually taken is the gain of daily weight.

Although the gain of daily weight is a good technique, the age or the number of days necessary to reach a special processing weight is another good character that can be used to evaluate the pork growth rate. Both concepts have been accepted in countries traditionally recognized for the lamb meat processing and consumption.

B.-Goat Reception

The transport is done by trucks especially modified to this work. They must work in slow speed without sudden breaks and accelerations that may impart pain to the animals. The night transportation must be preferred to avoid animal injury and because of the cool temperature. The amount of animals into the loads is determined concerning the optimum space among each one. The animals must not be cramped or shaken (in empty gaps) inside the back of truck.

As soon as the animals arrive in the abattoir the animals are unloaded using mobile ramps that can fit to the height of the vehicle. Ramps and chutes should be strong, with no gap between the sides of the ramp and the truck. Ramps should not be steeper than 20°. In the next step, the herds are identified. The identification can ensure that any possible sanitary problem (that may occur in the slaughtering processing line) will be communicate to the responsible person and quality control measures be done.

At this point the animals that show excessive tiredness signs, high body temperature or another behavior that may indicate some abnormality are led to observation far from the others. In case of sickness confirmation, the animal must be sacrificed and the human consumption must be forbidden and ensured.

Afterward, the animals must rest to avoid undesarible alterations in the meat quality. Through this period and immediately before the stunning the animals are constantly bathed to remove the animal body dirties and make then quiet.

Twenty four hours before the stunning, the food supply is cutted to provide the stomach clearing (emptying). This is an important quality measure to reduce the hazard of contamination during the slaughtering process.

2.2.-Post - mortem concerns

Goat

Post - mortem concerns



A.-Stunning

Special measures should be used regarding the stunning methods to ensure that the humanitarian animal death (to avoid the risk of cruelty). Animals must be stunned or rendered unconscious before they are bleeding. When religious reasons do not allow stunning, extra care is needed to ensure that bleeding causes the minimum of distress to the animal. Drugs cannot be used in the meat industry to induce unconsciousness in animals for slaughter since unacceptable residues would remain in the meat.

Generally, animals are stunned by a captive bolt pistol, by a blow from a pole-axe or in the most cases by electric shock. In recent years the dressing of carcasses has been carried out more frequently as they hang vertically rather than when supine on the abattoir floor. These changing circumstances make it rather less important to ensure that the heart is still functioning as blood can drain quite effectively from the carcass even when heart action has ceased.

B.-Bleeding

If the period between stunning and bleeding is too prolonged the meat quality level will decrease because the heart continues to pump the blood and it can increase the blood pressure and burst the vessels. It'll cause blood coagulation ("blood splash") inside the muscles as an undesirable meat character. When using electrical stunning this consequence is more probable because the electrical shock will certainly increase the blood pressure and it requires less time among the stages of stunning and bleeding.

Lambs are usually exanguinated by a puncture wound which opens the major blood vessels at the base of the neck, not far from the heart. The trade name for this process is sticking. If the sticking wound is inaccurately placed, exsanguination may be too slow, and it may be almost halted by the formation of large blood clots. Incomplete exsanguination increases the amount of residual blood in the carcass and it may promote the growth of microorganisms. The lean meat may then appear unduly dark and the fat may become streaked with blood.

C.-Pelting

In removing the skin of sheep and goats initial cutting of the skin is done around the leg to expose and loosen the tendon of the hock for use as a means of hanging the carcass. This process is called legging. A second step called pelting (after the term pelt normally applied to the skins of lambs and other wool or fur-bearing animals) involves the removal of the entire skin and preparation of the animal body for evisceration.

Tropical sheep and goats have hair not wool on their bodies, thus the term skinning is more appropriate for them. Skinning, like stunning, can be done either in the horizontal or hanging position, the former being more suited to small slaughterhouses and the latter for larger premises with bigger orders and with facilities or equipment for railing the individual carcasses one after another.

D.-Evisceration

The evisceration consists in opening and taking out the internal organs. At this point the main concern is taking care not to cut special organs like stomach or intestine because it would probably contaminate the meat and compromise its consumption.

A method for eviscerating, cleaning and trimming the animal to produce a dressed carcass is described below. It is important to have some idea of the relative weights of the components removed during slaughter. If possible, the carcass should be suspended on an overhead rail in a manner that enables the removal of the several parts of the hindlimbs just to make this stage easier. In some cases the carcass can be eviscerated on flat or rolling tables.

- (1) skin the head and remove the skull and lower jaw, leaving the whole of the neck and the skin of the head hanging on the carcass,
- (2) remove each foot and the distal part of each limb by cutting through the joint immediately proximal to the long cannon bone,
- (3) make a long incision through the hide in the midline of the chest and abdomen
- (4) remove the hide altogether if suitable equipment is available, or just remove it from the ventral part of the body and leave it temporarily hanging from the animal's back,
- (5) open the thoracic cavity with a midventral saw-cut through the breast bone or sternum,
- (6) open the abdomen with a long mid-ventral incision, and remove the penis or udder tissue, and any loose fat in the abdominal cavity,
- (7) split the pelvic girdle with a mid-ventral knife-cut or saw-cut through the cartilage that separates the pelvic bones in the midline,
- (8) cut around the anus and close it off with a plastic bag,
- (9) skin out the tail (if this was not done earlier),
- (10) separate the esophagus (which takes food to the stomach) from the trachea (which takes air to the lungs), by pulling the esophagus through a metal ring; close off the esophagus by knotting it,
- (11) eviscerate the carcass by pulling out the bladder (and uterus if present), intestines and mesenteries, rumen and other parts of the stomach, liver; after cutting through the diaphragm, remove the plucks (heart, lungs and trachea),
- (14) wash the carcass and pin a shroud over it to smooth the subcutaneous fat.

E.-Washing

Washing of the dressed carcass is more complex than it might first appear. Apart from considerations relating to water purity and waste treatment, consideration must be given to sanitizing factors such as chlorine, organic acids and high temperature. Sanitizing agents may greatly reduce the levels of surface bacteria when the carcass is washed, but at the risk of hiding poor sanitation at earlier stages of processing. There is much to commend the philosophy of preventing initial contamination rather than removing it once it is present.

F.-Chilling

After the carcass release, it is led immediately to the chilling room. The goal is to reduce the temperature as fast as possible to avoid the microbial growth (bacteria) that may cause meat spoilage and offer a hazard to the consumer-€™s health.

When the temperature reaches the right levels (usually with 18 hours of chilling) the carcass is led to commercialization or it goes to the boning room to continue in the process providing the manufacture of other products.

Chilled meat is usually kept for the sale in refrigerated display cabinets, either unwrapped or portioned and packaged for self-service outlets. Refrigerated display cabinets may have fan-assisted convection and/or natural convection. Fan-assisted types are better able to maintain a lower temperature as they are less affected by draughts. Cabinets should be stacked to maintain a good air flow around all meat.

G.-Boning and Cutting

The development of meat processing introduced the need for cutting quarters, halves or whole carcasses into smaller pieces which, according to their quality and market value, are used for culinary purposes and processing respectively.

Lamb carcasses are generally not split into halves after dressing because they are not thick enough in any location to create cooling problems. Begin cutting the lamb carcass by removing the thin cuts, breast and foreleg

Within each animal carcasses and associated with the different muscles there are variations in tenderness that dictate how different cuts of meat should be prepared to yield the most palatable foods. Because of these differences in tenderness, juiciness and flavour, each meat cut should be merchandised according to its availability and palatability characteristics. Consequently, different prices should be charged for different cuts from the various meat animals so that consumers have choices.

Four essential points when cutting lamb are:

- . Cut across the grain of meat when possible.
- . Use sharp knives and saws for speed and good workmanship.
- . Keep the cutting table orderly and have a place for everything.
- . Be clean and sanitary in all operations.

3.- Processed products

Goat Meat Products

Goat is the most highly consumed meat in the world; and more goat's milk is consumed worldwide than cow's milk. Like goat's milk and cheese, the meat is unique in flavor and palatability. It is leaner than many other red meats and usually less tender. However, its leanness has a place in today's demand for meats with less fat. Goat meat is termed either cabrito or chevon, depending on the goat's age at slaughter. Cabrito (Spanish for "little goat") is from kids slaughtered within the first week of birth. Its main use is for barbecue meat, and it is highly sought after by certain ethnic groups. Chevon, on the other hand, is from older kids slaughtered close to or after weaning. Of these two types, cabrito is the more tender. Older (mature) goat meat is used primarily in processed foods.

Sausage Process

The process of sausage manufacturing originated from the necessity to increase the uses of remnants of meat, fat of clearness meat parts and less nobles cuts, adding value to these products. There are many different types of sausages. The differences between them are related with the type of meat, the size of meat grinder disk, the seasonings, the casing diameter, the buds length and the presence or not of smoking.

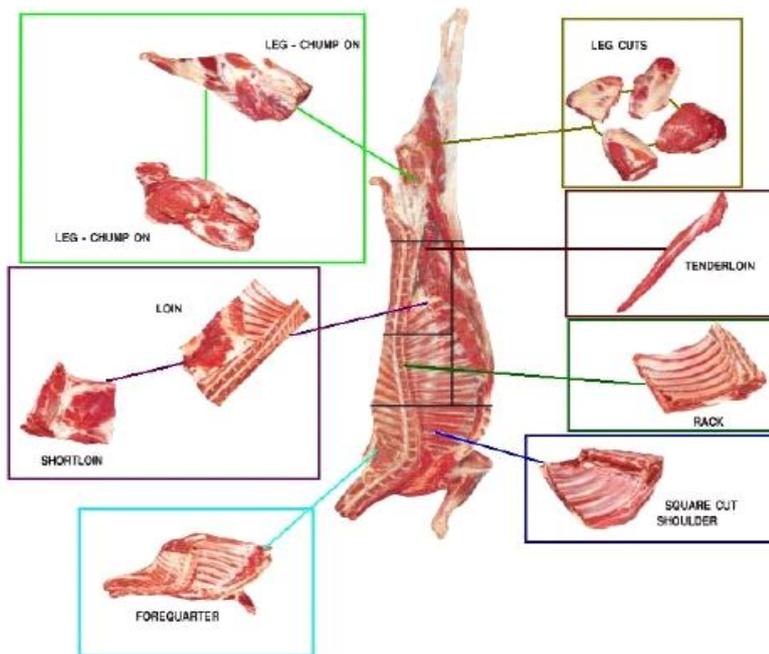
Salted products Process

The salting process act in control and reduction of microorganism, increasing the product shelf-life. They are prepared in the same way, so the process is going to be explained just one time.

Smoked products Process

The smoking process, besides adding value to the meat cuts, it also makes desirable alterations like gold outside color, smoked taste and good juiciness. The smoking process associated with salt using (sodium chloride, nitrite of sodium) and with dryer, act in the reduction and control of microorganisms, and increase the products shelf-life . The creation of new product options enables alternative chooses for the consuming market and a possible additional income source for small scale producers.

Goat Cuts Chart



Sausage Process



A.-Bonning

The goat parts are taked to the processing room where they will be boned.The carcasses of goat are split into sides or cut into fore and hindquarters. The sides or fore and hindquarters can be sold or they can be boned. You can sold the cuts or they can be used to make differents products.

B.-Formulation

The seasoning, goat meat, fat and additives are weighted according to the table below.

Table - Sausage Formulation

Ingredients	Quantities
Goat meat	80 Kg
Swine Fat	20 Kg
Salt	2,50 Kg
Water	Enough to dissolve the formulation solid components
Nitrite / Nitrate	0,20 Kg (or according to specific national legislation)
Ascorbic acid / Ascorbic acid salts	0,54 Kg (or according to specific national legislation)
Other seasonings	(it varies according to the type of sausage that is going to be made)

C.-Meat and Fat Grinding

The weighted meat and fat should be cut in pieces that can be put, without difficulty, inside the meat grinder. The grinder meat disk diameter is going to be chosen according to the type of sausage that it is going to be done.

D.-Ingredients Mixture

The ingredient mixture should be done in a mixer that could make a good ingredients homogeneity with the meat and the fat, forming an homogeneous mass.

E.-Casing Preparing

The casing should be washed to take off the excessive salt. After, it should be maintained in treated water for, at least, 10 minutes. This procedure is important to casing rehydration and recuperation of elastic characteristics.

F.-Stuffing

The mass is transferred to the stuffing machine. The stuffing is made using goat casing which is put in stuffing machine end. Knots are made, spaces after spaces, that are divided using cotton wire (string). The knots length is according to the type of sausage that it is going to be made.

G.-Storage

The fresh sausage storage is made under refrigeration, because it is a perishable product.

3.2.-Goat Smoked products

The smoking process, besides adding value to the meat cuts, it also makes desirable alterations like gold outside color, smoked taste and good juiciness. The smoking process associated with salt using (sodium chloride, nitrite of sodium) and with dryer, act in the reduction and control of microorganisms, and increase the products shelf-life . The creation of new product options enables alternative chooses for the consuming market and a possible additional income source for small scale producers.



◦ Smoked Spare Ribs

◦ Smoked Loin

◦ Smoked Bacon

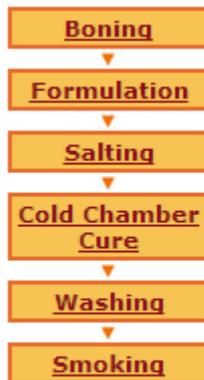


◦ Smoked Sausages

3.2.1.-Smoked Loin processing

Goat

Smoked Loin processing



a.-Boning

The goat parts are taken to the processing room where they will be boned. The carcasses of goat are split into sides or cut into fore and hindquarters. The sides or fore and hindquarters can be sold or they can be boned. You can sold the cuts or they can be used to make different products.

b.-Formulation

The seasoning, goat meat, fat and additives are weighted according to the table below.

Table - Loin Formulation

Ingredients	Quantities
Goat loin	100 Kg
Swine Fat	20 Kg
Fine Salt	3 Kg
Fine Sugar	0,50 Kg
Nitrite / Nitrate	0,20 Kg (or according to specific national legislation)
Anti oxidative substance (Sodium Eritorbate or Citric Acid)	0,25 Kg Kg (or according to specific national legislation)
Other seasonings	It may vary

c.-Salting

The prepared parts of the loin will be salty with the mixture of the described ingredients in the formulation. The salting is made by the friction of the solid components in the meat part.

d.-Cold Chamber Cure

Then, they are put inside plastic boxes or in stainless trolleys dump-cart and then, they are transferred to chilling chamber at 5°C where they have to stay during a period of four days because of the curing process.

e.-Washing

After cure, the parts are washed with drinking water for the excessive salt removal and then, they are transferred to the processing room. Hooks are used to place the parts in the cages.

f.-Smoking

The cooking and smoking process should follow four stages:

- 1 hour at 60°C with opened chimney
- 1 hour at 65°C with closed chimney
- 2 hours at 70°C, or until the inside temperature raises 68°C
- 12 hours only with cold smoke, maximum 30°C, or until the desirable smoked point.

After cooking, smoking and natural cooling of the loin, they should be put on shelves in the chilling chamber where they are going to stay until the sale moment.

3.3.-Smoked Salted processings

Smoked Sausages processing



a.-Fresh Sausages

The fresh sausage are keeping into the chilling chamber. Metallic sticks are used to place the sausage in the cages and they are taken to the smoking room.

b.-Smoking

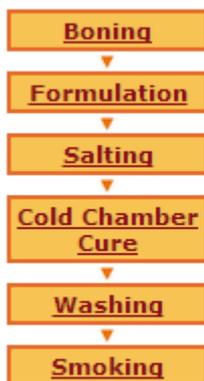
The fresh sausage are put in smoking room for one hour at 50°C, or until it raises the desirable point.

c.-Washing

When leaving the smoking room, the sausages are taken to the cold water shower for the cooling bath and thermal shock, during approximately 10 minutes. After this, the sausage surface is dried and they must go chilling chamber.

3.2.3.-Smoked Spare Ribs processing

Smoked Spare Ribs processing



a.-Boning

The goat parts are taken to the processing room where they will be boned. The carcasses of goat are split into sides or cut into fore and hindquarters. The sides or fore and hindquarters can be sold or they can be boned. You can sold the cuts or they can be used to make different products.

b.-Formulation

The seasoning, pork meat, fat and additives are weighted according to the table below.

Table - "Smoked Spare Ribs Formulation"

Ingredients	Quantities
Goat loin	100 Kg
Swine Fat	20 Kg
Fine Salt	3 Kg
Fine Sugar	0,50 Kg
Nitrite / Nitrate	0,20 Kg (or according to specific national legislation)
Anti oxidative substance (Sodium Eritorbate or Citric Acid)	0,25 Kg Kg (or according to specific national legislation)
Other seasonings	It may vary

c.-Salting

The prepared parts of spare ribs will be salty with the mixture of the described ingredients in the formulation. The salting is made by rubbing the solid components in the meat part.

Ingredients	Quantities
Goat loin	100 Kg
Swine Fat	20 Kg
Fine Salt	3 Kg
Fine Sugar	0,50 Kg
Nitrite / Nitrate	0,20 Kg (or according to specific national legislation)
Anti oxidative substance (Sodium Eritorbate or Citric Acid)	0,25 Kg Kg (or according to specific national legislation)
Other seasonings	It may vary

d.-Cold Chamber Cure

Then, they are put inside plastic boxes or in stainless trolleys dump-cart and then, they are transferred to chilling chamber at 5°C where they have to stay during a period of four days because of the curing process.

e.-Washing

After cure, the parts are washed with drinking water for the excessive salt removal and then, they are transferred to the processing room where strings are going to be put on the parts end. Hooks are used to place the spare ribs in the cages.

f.-Smoking

The cooking and smoking process should follow four stages:

- 1 hour at 60°C with opened chimney
- 1 hour at 65°C with closed chimney
- 2 hours at 70°C, or until the inside temperature raises 68°C
- 12 hours only with cold smoke, maximum 30°C, or until the desirable smoked point.

After cooking, smoking and natural cooling of spare ribs, they should be put on shelves in the chilling chamber where they are going to stay until the sale moment.

3.2.4.-Smoked Bacon processing

Smoked Bacon processing



a.-Boning

The swine parts are taking to the processing room where they are going to be boned.

b.-Salting

The prepared parts of spare ribs will be salty with the mixture of the described ingredients in the formulation. The salting is made by rubbing the solid components in the meat part.

c.-Cold Chamber Cure

Then, they are put inside plastic boxes or in stainless trolleys dump-cart and then, they are transferred to chilling chamber at 5°C where they have to stay during a period of four days because of the curing process.

d.-Washing

After cure, the parts are washed with drinking water for the excessive salt removal and then, they are transferred to the processing room where strings are going to be put on the parts end. Hooks are used to place the spare ribs in the cages.

e.-Smoking

The cooking and smoking process should follow four stages:

- 1 hour at 60°C with opened chimney
- 1 hour at 65°C with closed chimney
- 2 hours at 70°C, or until the inside temperature raises 68°C
- 12 hours only with cold smoke, maximum 30°C, or until the desirable smoked point.

After cooking, smoking and natural cooling of spare ribs, they should be put on shelves in the chilling chamber where they are going to stay until the sale moment.

3.3.-Goat Salted Products

Goat Salted Casing Process

Proposal: casing utilization of the goat slaughtered in the own facility. The goat casings are going to be used in Sausage Processing. The casing should be transparent and it should allow the product breath, so that the humidity and smoke could enter and get away, respectively. And it should unfasten with easiness from the finished product, thus the product quality don't be damaged during prolonged storage.

Goat Salted Cuts Process

The salting process act in control and reduction of microorganism, increasing the product shelf-life. They are prepared in the same way, so the process is going to be explained just one time.



◦ Salted Cuts



◦ Salted Casings

3.3.1.- Salted Casings Processing

Proposal: casing utilization of the goat slaughtered in the own facility. The goat casings are going to be used in Sausage Processing. The casing should be transparent and it should allow the product breath, so that the humidity and smoke could enter and get away, respectively. And it should unfasten with easiness from the finished product, thus the product quality don't be damaged during prolonged storage.

Goat Salted Casings processing



a.-Casing Extraction

The slaughtered animal intestines are taken out manually or with a knife relief. This procedure demands skillfulness, because the finished product quality depends on the attention in that removal. The slaughtered animal intestines are extracted carefully, without perforate them, for avoiding contamination and for reaching the minimum length of the casing required.

b.-Fat Removal

On the stainless table and with potable current water at ambient temperature, the parts of the intestinal treatment are separated for the next procedure. At the beginning, the epiploic is removed and the thin and thick intestine are separated. Between intestinal curves, there is a variable quantity of mesenteric fat that has to be removed as much as possible because of two reasons: one is because it could be, before processing, transformed in industrial fat; and the other because it continues around the casing causing fat oxidation, that makes the casing inappropriate for the human consumption.

c.-Evacuation of the Intestinal Content

The intestinal content is taken out manually or with an equipment with water jets. The water jets help to clean the casing too. Feces removal is made pressing intestinal curves between two fingers of one hand, while it is pulling with the other hand. Feces, normally liquefied in the portion of the thin intestine, are drained continually to a specific container.

d.-Mucous Removal

The next procedure is to put the casing inside out. The intestines are immersed in stainless tank, that contains drinking water. They are hanged with their ends in bumps disposed serial on one of tank brims. While the mucous is exposed, the intestine is gliding for a tank, slanting about 35° that contains another collector box in its end. The inside out casing are scraped for mucous removal. After the mucous removal, is made the casing washing, and then they are put in saturated brine. They are stored in saturated brine until the next day, before they were classified and salted. The mucous removal is a critical stage in the casing preparation process. If it hasn't been executed correctly, the casing could deteriorate. The brine immersion is important because this stage is the beginning of cure process, besides blood removal that stays in intestines.

e.-Salting

The casing is taken back from the brine and they are put in trays or in a stainless trolley where they are going to receive thick salt in excess. They have to stay in cold storage until

finished salting process. The exuded has to be drained and more salt can be added, if it is necessary.

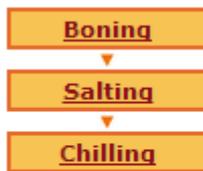
f.-Chilling

The casings, even salted, have to be stored under refrigeration, because there is a risk of deterioration.

3.3.2.-Salted Cuts Processing

The salting process act in control and reduction of microorganism, increasing the product shelf-life. They are prepared in the same way, so the process is going to be explained just one time.

Salted Cuts processing



a.-Boning

The goat parts are taked to the processing room where they will be boned.The carcasses of goat are split into sides or cut into fore and hindquarters. The sides or fore and hindquarters can be sold or they can be boned. You can sold the cuts or they can be used to make differents products.

b.-Salting

The parts are put in trays or in a stainless trolley. The salting is made by the friction of the salt in the parts and then they receive thick salt in excess. The proportion between salt and meat is three kilos of salt for each kilo of meat. The parts stay in excessive salt during one week. They have to stay in cold storage until finished salting process and the exuded has to be drained and more salt can be added, if it is necessary.

c.-Chilling

The parts, even if salted, have to be stored under refrigeration, because there is a risk of deterioration.

4.-Goat Health Cares



Several diseases can be transmited by the meat consumption. This diseases can be classified into three groups :

- (1) Diseases that can contaminate the men by infected animals like tuberculosis and brucellosis;
- (2) Parasital diseases that can contaminate the human by the consumption of meat infested by parasite micro eggs (cisticercus).
- (3) Food toxic infection from microorganism caused by pathogenic bacteria like Salmonella, Shigella, Staphylococcus, Clostridium botulinum and Clostridium perfringens.

The major production cost of an intensively managed meat goat operation is feed. If goats are to be fattened using high grain ration, feed can account for up to 60% of the production cost. Since grain feed is more expensive than forage, it is important for a producer to estimate the cost benefit analysis before the dry lot feeding of goats is initiated. Goats can be fed various energy feeds. Sorghum and corn have similar feeding values. Also, barley and oats can be fed as portions of energy feed.

Cotton seed meal, peanut meal or soybean meal can be used as major protein supplement. These concentrates can account for almost 50% of the ration of finishing goats. It is always necessary to balance rations of goats for major nutrients. Finishing goats can be allowed to graze on good pasture or supplied with harvested forage to meet their roughage needs and minimize production cost.

Goats are sensitive to inclement weather. They need to be allowed access to clean shades with proper ventilation, feeders and waterers. Goats raised on high grain ration are prone to overeating disease (enterotoxemia). Also, goats in intensive management could suffer from coccidiosis and internal parasites. There are prophylactic and other treatment drugs which can be used with goats. Local extension agents will be good contact for health needs and sources of prescription and nonprescription drugs. Generally, goats are susceptible to most diseases and parasites affecting other ruminants.

Equipment description

Prices Codes	Cost (\$US)
1	0-100
2	100-500
3	500-2000
4	>2000

Suppliers of Meat processing equipment

Processing Operation	Equipment Category	Scale	Technical Description	Price Code	Reference
Stunning	Stunning Box	S - M	Equipment provided by a entrance revolving door and a fake floor that imparts the animal slide to the place where it will be lifted up to the aerial track. The hogs will be stunned inside the stunning box one after one by electrical shock or mechanical st	4	1
Stunning	Stunner	S - M	The stunner can be an electrical or mechanical (Captive bolt pistol) equipment to stun the animals. The electrical stunner provides an electrical chock while the mechanical stunner imparts a mechanical punch in the animal. The stunning must happen as fast	3	1
Bleeding	Lifting Hook	S - M	This is a special device to lift up the animal from the stunning box floor to the aerial track. It works with an electric motor connected to a set of cogs that slow down the original rotation speed to lift the animal slowly. The chain rolls around a small	4	2
Scalding	Scalding tank	S - M	The scalding tank is an stainless steel tank supplied by hot water (generly heated by steam from a boiling) used to become the swine skin softer enough to be scraped. The pig's hair are taken out and then the carcass is pulled up in a ramp to be lifted u	4	3
Plucking	Pluckers	S-M	The equipment has rubber fingers that rub the feathers off the carcass. The defeathering equipment is composed of a few units of these disks, and the carcass is passed between the rotating disks. The fingers can also be mounted on drums that rotate toward	4	4
Chilling	Chiller	S-M	The chiller is an equipment used to decrease de carcass temperature as fast as possible. The chiller is basicaly a tank with a metallic helix that turns and impart the carcass movement along the tank. The tank is full of cold water and the helix turns slo	4	7
Overall Process	Aerial Track	S - M	The aerial track has the hole of guiding the carcass through the several stages of the process. The contact between the carcass and the track is done by a wheelbarrow that rolls to both sides and can be hand pushed or hand pulled. The aerial track outline	1 / meter	12
Overall Process	Fixed Platforms	S - M	The platforms are used in several stages of the slaughtering process and they can change a lot from one supplier to another. The general description consists in a metallic frame (preferably stainless steal) with enough space to the activity that need to b	3	13
Overall	Knives	S - M	This equipment is used to sterilize knives that	3	6

Process	Sterilizer		are used during the process. This stage is important to control the microorganism growth.		
Overall Process	Set of Knives	S - M	The knives must be made of a stainless steel blade and a hard and antimicrobial plastic handle. The knives will be used in all the factory, but each section has its own set of knives. They need to be constantly sanitized with steam during the industrial p	1	4
Overall Process	Wheel Barrow	S - M	The wheel barrows are devices to carry and lead the carcass through the processing stages from the bleeding stage to the chilling chamber. The wheel barrows roll on the aerial track and must be easily taken out to be cleaned.	2	15
Sausage Processing	Mixer	S - M	The mixer must be made of stainless steel and the main function is mixing the meat, fat, seasonings and all the other ingredients used in sausage production. Mixing is a very common step in producing meat products. It is used to achieve four major goals:	4	7
Sausage Processing	Table Scale (Weight Scale)	S - M	This equipment is used to measure all the ingredients of all formulations. It needs to be able to measure the exact amount of the ingredient at once. Therefore, the size of the scale will depend on the amount of product is usually produced. The digital o	3	11
Sausage Processing	Meat Grinder	S - M	<p>The meat grinder can be found in several sizes but the working principles are the same. A metallic helix revolves around the axis and pushes the meat cuts to a metallic disc with holes. After passing through the holes, the meat is cut by a sharpened blade.</p> <p>The size reduction of large meat chunks is the most common process involved in the manufacturing of ground and comminuted meat products. The three main methods used are grinding, flaking and chopping. Grinders - This is probably the most common method of</p> <p>When the operator notices an uneven pattern of the meat coming out from the grinder, the machine should be stopped, and the connective tissue (or any other obstacle) trapped behind the plate should be removed.</p>	3	8
Sausage Processing	Sausage Stuffing Machine	S - M	<p>This equipment is used to stuff the natural case with the prepared meat. It is composed by a cylindrical tube and a mobile piston made of chromed iron or stainless steel. The prepared meat is put inside the tube and is pressed against a funnel by the piston</p> <p>Manual, semi automated and fully automated machines are used to stuff raw meat batter into casings. Stuffers vary in size and degree of automation but generally can be divided into two basic types: piston and pump stuffers. The piston is air driven, using</p>	3	9
Processing Room	Metallic Table	S - M	These are special tables made of stainless steel. It has four wheels that give it mobility. This table will be used at the Visceras Room, the Cleaning Room and at the Processing	2	19

			Room. This table must be sanitized after and before use with steam.		
Processing Room	Knives Sharpener	S - M	It is used to keep the knife's blade sharpened. It's very important to facilitate the operations during the slaughtering and the production process. Just like the knives, the sharpener must be constantly sanitized with steam during the industrial process.	1	14
Processing Room	Gas Cylinder	S - M	It is a container for petro liquefied gas that is used to the singeing.	1	16
Processing Room	Metallic Glove	S - M	The metallic gloves must be used to avoid accidents while the employees are cutting the carcass. Each employee who has a knife in on hand must have a glove in the other hand. The gloves must fit comfortably and the material should be stainless steel.	1	17
Processing Room	Electric Saw	S - M	The electric saw is used to share the carcass into two or more parts. This saw must be especial to this work, it means that the chain (or saw blade) and the recovering material must be appropriated to the activity.	3	4
Processing Room	Floor Scale (Weight Scale)	S - M	The floor scale is used to weight the trolleys loaded of meat, fat and other ingredients in large amounts. This scale can be mechanical or electronic, but the mechanical scale is generally adapted to the floor. The mechanical scale is usually much cheaper	3	11
Cleaning	Water Pressure Hose and Nozzle	S - M	These equipment are going to be used on all the sections of the factory to clean the ground, and also the carcass. It is usually made of hard plastic, strong enough to support the water pressure.	2	5
Cleaning	Metallic Sink	S - M	This sink is going to be placed in the Cleaning Room and in the Sanitary Entrance. In the first place, it is going to be used to help the utensils cleaning.	3	19
Changing Room	Toilet	S - M	It need to have the necessary amount to give comfort to the employees. It is recommended that all the toilets are sanitized every day.	2	18
Changing Room	Shower	S - M	It is used in the end of the shift, so the employees can clean themselves before going home. It need to have the necessary amount to give comfort to the employees. It must have an antiskid floor to avoid accidents.	1	18
Changing Room	Closet	S - M	It is used to store the employee's personal objects and clothes. The working uniform should not be stored at this closet. The amount of closets depends on the number of employees.	2	18
Changing Room	Paper Towel Container	S - M	It is used to contain the paper towel that will be used to dry the hands after the use of the basin.	1	18
Salting	Salting Tank	S - M	To prepare the salted meat is used a salting tank. The pieces of meat and salt are put inside the tank and stay there until this process is completed. The tank is usually made of stainless steel and have a bottom exit to drain the exuded liquid from the m	4	10

Aditives Storaging	Pallet	S - M	This is a very useful equipment. It has the objective of keeping the products far away from the ground. In this case it will be used to store salt bags and other condiments that come in large packs, and also any kind of additive that needs this kind of st	1	20
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