

Situation and Outlook Report

For Rabbit Meat



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Research Questions

The research will focus on answering the following key questions; however, it will also incorporate other pertinent information on the subject matter.

1. What are the breeds of rabbits used predominantly for meat production in Jamaica?
2. What breeds of rabbits are best suited for meat production?
3. Who are the major producers of rabbit meat?
4. How viable is the current rabbit industry in Jamaica and how practical would it be to enter into large-scale commercial rabbit production?
5. What are the current farmgate, wholesale and retail prices for rabbit meat?
6. Who are the major buyers of rabbit meat?
7. What is the required rabbit meat specification and classification among buyers?

Executive Summary

- According to the American Rabbit Breeders Association (ARBA) there are 48 unique rabbit breeds.
- There are a number of different rabbit breeds in Jamaica with the Flemish Giant, Checkered Giant and the New Zealand White and Black being the most common.
- Medium-weight New Zealand Whites and Californian rabbits are most suited for meat production.
- The dress percentage of rabbits ranges between 45-55% of live weight.
- According to the Statistical Institute of Jamaica (STATIN), there has been no import of rabbit meat in Jamaica during the period 2010-2013.
- The factors supporting the viability of rabbit meat include breeding and availability of housing material and other equipment essential to rabbit farming.
- The identified negative factors affecting the viability of rabbit meat include its relatively low demand, cultural limitations, high cost of production and resultant high retail price.
- The cost of production for rabbit meat is \$680.59 per kilogram (kg).
- The most frequent farmgate prices for rabbit meat are \$1,540 and \$1,760 per kilogram.
- A random sample of 81 commercial entities was chosen, with a total of 9.9% representing those with either a current or future demand for the rabbit meat.
- By-products such as manure, fur and charms have the capacity to be viable in the Jamaican market.
- Rabbit carcasses must be passed fit for human consumption by public health inspectors.

Overview of the Rabbit Industry

Rabbits are small mammals in the Leporidae family of the order Lagomorpha and are distinct from rodents. According to the American Rabbit Breeders Association (ARBA) there are 48 unique rabbit breeds and these are mainly raised for their fur, lab research, as pets or for consumption. Other mammals in the Leporidae family such Hares and Pikas share a similar distinction from rodents, however, since these have not surfaced in Jamaica as being bred for commercial purposes, they will not be explored in this study.

In Jamaica, the rabbit meat industry is largely comprised of small scale and backyard farmers. These farmers primarily supply small quantities of rabbit meat to persons within their communities and to a lesser extent, commercial entities. Domestic rabbits are those commonly used for commercial purposes in Jamaica and based on the interviews conducted with rabbit farmers, the most popular breeds used for this purpose are the Flemish Giant, Checkered Giant and the New Zealand White and Black rabbits. While there are a number of different breeds of rabbits in the island, they are largely categorized as crossbreeds (mixed breed) rather than purebred rabbits.

Below is a list of rabbit breeds most frequently found in Jamaica, all of which are used in the island for meat production to some degree.

Rabbit Breeds Common to Jamaica



The American Chinchilla (weight 4.1-5.5 kg). This rabbit was developed primarily for the fur trade. The first chinchilla rabbits were of the breed we now call Standard Chins – weighing only 2.3-3.2 kg. As soon as they reached the United States in 1919, breeders started working towards a larger version of the breed, to be more useful for meat and pelt production. Their new breed, the “Heavyweight Chinchilla” was accepted by the ARBA in 1924. The name was soon changed to American Chinchilla – possibly because a giant version of the breed was already in development.



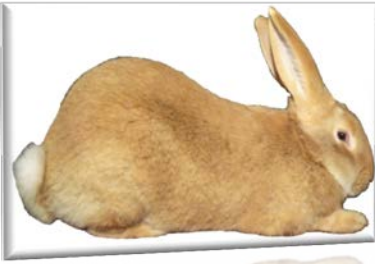
New Zealand White Rabbit (weight 4.1-5.5 kg). This rabbit is used in meat production more than any other single breed worldwide. White is the most valuable variety for commercial purposes because it is easily dyed. Therefore, the white is the most highly developed, most commonly seen, and most competitive colour. It was not the first variety, however, New Zealand red showed up first, and now black and broken pattern are also recognized. Blue is on its way to acceptance.



Californian Rabbit (weight 4.1-5.5 kg). Widely raised for their meat and fur value both by large scale rabbitries and backyard breeders. This breed was developed in the 1920's by George West of California. He crossed Himalayans with Standard Chinchillas and then added some New Zealand blood to achieve the size he wanted. Today only the New Zealand white surpasses the Californian in its popularity as a commercial rabbit.



Checkered Giant (weight above 5 kg) The Checkered Giant is a breed of rabbit developed in Europe. Mature Checkered Giant bucks (male rabbits) should weigh at least 5 kg and mature does (female rabbits) 5.4 kg, but there is no specified maximum weight. The Checkered Giant is outweighed by the Giant Chinchilla and Flemish Giant and is considered to be more of a show rabbit rather than a meat rabbit. As with other large breed rabbits, their bone to meat ratio makes it less suitable for meat production commercially than the medium breeds. This giant is one of only 11 breeds with defined markings. However, body type markings differ between European and American Checkered Giants, although they are considered to be the same breed.



Flemish Giants (weighs a minimum of 5.9 kg) this rabbit is considered to be gentle giants. The Flemish giant is primarily a fancy breed, raised for show and pets. These are understandably mistaken for meat rabbits; however the Flemish consumes too much feed for the meat yield to be efficiently viable.



Satin rabbits weigh between 4.1 – 5 kg and are the ultimate dual purpose rabbit for homestead and commercial use. This is because, in addition to having a unique coat, they possess a high meat to bone ratio. The ideal weight of this breed is 4.32 – 4.5 kilograms.



The Silver Fox weighs a maximum of 5.5 kg. It is a beautiful rabbit, which stands apart from other breeds. Its does have large litters, produce plenty of milk and are excellent mothers. The young are born either solid black or blue, however their fur begins to turn silver at about 4 weeks old, and the entire process takes 4 months to complete. The fur is one of the most attractive and unusual features of the breed and is extremely dense, measuring between 1 ½ to 2 inches in length.

Rabbit Meat Production

According to Penn State College of Agricultural Sciences, rabbits are classified according to their weight or type of hair. The weight categories are (a) small (1.36 to 1.82 kg), (b) medium (4.09 to 5.45 kg), and (c) large (6.36 to 7.27 kg). It adds that the medium-weight New Zealand Whites are most suited for meat production, with the next best breed being the Californians as both provide the best balance in terms of meat-to-bone ratio when compared to the others in existence. Furthermore, for both breeds, the litter is usually large in number and boast a fast grow-out time, making them efficient for economic activity. (Shaeffer et. al. 2008, p. 1).

Rabbit meat Classification

The United States Department of Agriculture (USDA) Food Safety and Inspection Service states that rabbit meat is classified in three (3) categories, fryer, roaster and giblets. (2006, p. 1)

1. Fryer (young rabbit)

Rabbits weighing between 0.68 kg and rarely over than 1.59 kilograms are known as “fryer” or “young rabbits”, and are at least 12 weeks of age. At this stage, the rabbit’s flesh is tender, fine grained, and is of a pearly bright pink colour and can be prepared in the same way as young poultry.

2. Roaster (mature rabbit).

The second category, the roaster/stewer is a mature or old rabbit carcass of any weight. It usually weights more than 1.82 kilograms when processed and comes from a rabbit usually 8 months of age or older. As the name suggests the flesh of the mature/old rabbit, is firm and coarse grained, unlike fryers or young rabbits. At this stage of growth, the muscle fibre is slightly darker in colour and less tender, and the fat may be creamier in colour than that of a fryer. Given that the meat has potential to be tough, it is best prepared by braising¹ or stewing.

¹ Braising means that you fry food lightly and then stew it slowly in a closed container

3. Giblets²

This refers to the inner organs of the rabbit, including the liver and heart.

Rabbit Meat Importation

According to the Statistical Institute of Jamaica (STATIN), there has been no import of rabbit meat in Jamaica over the period 2010-2013.

² While it is that the USDA defines giblets as heart and liver only, within Jamaica, giblets also include kidneys.

Summary of Specifications for Standards of Quality for Individual Carcasses or Parts

Effective September 5, 2002 (Not All Inclusive - Minimum Requirements and Maximum Defects Permitted)

	A Quality	B Quality	C Quality
Conformation:	Normal, slight deformities	Moderate deformities	Pronounced deformities
Fleshing:	Thick, well rounded, and full – well fleshed considering kind and class	Fairly thick, fairly well rounded - fairly well fleshed considering kind and class	Under-developed covering of flesh considering kind and Class
Muscle texture	Firm	Fairly firm	Soft or flabby
Cuts and Tears:	Carcass ^{1a}	Parts ^{1a}	Carcass ^{1b}
Loin, Rump, Hind Legs	1/4 in.	1/4 in.	1/2 in.
Forelegs, Ribs, Elsewhere	1/2 in.	1/2 in.	1 in.
			Parts ^{1b}
			1/2 in.
			1 in.
			Carcass
			Parts
			No limit, provided meat yield is not materially affected
Disjointed and Broken Bones:	Carcass ^{2a}	Parts ^{2a}	Carcass ^{2b}
	1 disjointed, no broken	1 disjointed, no broken	2 disjointed, 1 broken
			Parts ^{2b}
			1 disjointed, no broken
			Carcass ^{2c}
			No limit disjointed, 5 broken
			Parts ^{2c}
			1 disjointed, 1 broken
Missing Parts:	None		None
Discolorations:	Lightly Shaded ³	Moderately Shaded ^{4a}	Moderately Shaded ^{4b}
Carcasses			Moderately Shaded
Loin, Rump, Hind Legs	1 in.	None	2 in.
Elsewhere	2 in.	None	3 in.
Discolorations:	Lightly Shaded ³	Moderately Shaded ^{4a}	Moderately Shaded ^{4b}
Parts			Moderately Shaded
Loin, Rump, Hind Legs	1/2 in.	None	1 in.
Forelegs and Ribs	3/4 in.	None	1 1/2 in.
Trimming:	Carcasses or parts may be graded after a defect has been removed.		
Freezing Defects:	Slight darkening provided the carcass or part has a generally bright appearance. Occasional dry areas and small areas of clear or pinkish coloured ice may be present	May lack brightness. A few dry areas and moderate areas with layers of clear, pinkish, or reddish coloured ice may be present.	Large dry areas and no limit on amount or colour of ice present.

^{1a} A cut or tear up to 1/2 inches in length is permitted at the rump adjacent to the backbone. Cuts or tears caused by skin removal are permitted provided they do not result in an indentation in the muscle tissue, and do not detract from the appearance of the product.

^{1b} A cut or tear up to 1 in. in length is permitted at the rump adjacent to the backbone. Cuts or tears caused by skin removal are permitted provided they do not result in a significant indentation in the muscle tissue, and only very slightly detract from the appearance of the product.

^{2a} The ends of leg bones may not be shattered or broken beyond the point where the muscle tissue begins.

^{4b} The ends of leg bones may not be shattered, but may be broken beyond the point where the muscle tissue begins.

^{2c} The ends of leg bones may be shattered and broken beyond the point where the muscle tissue begins.

³ Evidence of incomplete bleeding, such as more than an occasional slight coagulation in a vein, is not permitted.

^{4a} Areas adjacent to the bone may have moderate discolorations, provided they do not exceed an aggregate area of 1/4 in. and are free of blood clots.

ence of incomplete bleeding shall be no more than slight. Discolorations shall be free of blood clots.

United States Department of Agriculture, Classes, Standards, and Grades for Rabbits AMS 70.300 *et seq.* Effective September 5, 2002

Dressed Weight



The dressed weight of a rabbit will vary depending on the quality of the animal at slaughter; its breed and age; the amount of fat on its body; and the number of internal organs left with the carcass. Normally the liver, heart and kidneys remain with the carcass and are considered when weighing it. Rabbits that are in an average or slightly better than average condition, will yield a dressing percentage within the range of 45-55% of their live weight.

Nutrition

Two types of nutrition programs are used for raising rabbits: (1) hay and grain diets or (2) commercial pellet rations. In addition to commercial pellets, Napier grass, King grass, Spanish needle, Mulberry plant and *Synedrella nodiflora* (fatten borrow) are all used by the Jamaica 4-H Clubs. Pellets meet all of a rabbit's nutritional requirements and are sold in Jamaica at a cost of \$1,498.10/25kg by Newport Mills Limited. Hi-Pro Feeds, the other major feed supplier in the island does not carry the product.

Pregnant does and those with litters should receive all the feed they can eat in a day while bucks and does without litters need 6 to 8 ounces of pellets per day. Rabbits also require fresh, clean water every day, therefore, an automatic watering system is preferred as it offers a continuous water supply while reducing waste and the risk of contamination. A doe and her litter will need 1 gallon of water per day in warm weather.

Nutritional Values of Common Meats¹

Meat (edible portion,uncooked)	Percent Protein	Percent Fat	Percent Moisture	Calories per Pound
Rabbit (fryer, with giblets)	20.8	10.2	67.9	795
Chicken (fryer, with giblets)	20.0	11.0	67.6	810
Veal (medium fat)	19.1	12.0	68.0	840
Turkey (medium fat, with giblets)	20.1	20.2	58.3	1190
Lamb (medium fat)	15.7	27.7	55.8	1420
Beef (fat)	16.3	28.0	55.0	1440
Pork (medium fat)	11.9	45.0	42.0	2050

¹Taken from Circular No. 547, U.S. Department of Agriculture, Washington, D.C.

Rabbit meat is high in protein, low in fat and contains less than half the calories of pork. According to the USDA, rabbit is the most nutritious meat known to man. Rabbit is an all-white meat, which makes this suitable for many diets. It works as a great substitute in any recipe crafted for chicken or pork.

Development of the Rabbit Industry

The Role of the Jamaica 4-H Clubs

The Jamaica 4-H Clubs has long played an integral role in the development of the rabbit industry. Currently, the organisation stocks over 250 rabbits at the Kingston and Linstead branches. These rabbits are mainly sold as pets but provisions are made at the Linstead branch for persons wanting to obtain the meat in quantities not exceeding 9.09 kg. The Jamaica 4-H Clubs also participates in trade shows providing samples of rabbit meat prepared in varying forms to patrons. This is in an effort to sensitize people about the existence and use of rabbit for meat, over and above its known trademark of making good pets.

The organisation is also making attempts to form a rabbit farmers association with the aim of educating and sensitizing farmers on the requirements of caring for rabbits and dealing with them commercially.

Given the predominantly backyard scale of operation the Association intends to source the animals from several farmers in instances of large-scale supply needs.

Commercial Meat Requirement

All rabbit farmers wishing to sell rabbit meat both to private persons and/or commercial entities must ensure that the following public health requirements are met:

- Butchers must be licensed;
- Persons with infectious diseases for example typhoid, influenza or tuberculosis etc. should not handle meat;
- Meat must be transported under sanitary conditions;
- Carcasses must be passed fit for human consumption by public health inspectors;
- Butchers must ensure that any packaging material used by them for wrapping meat minimizes spoilage. This means that the packaging must be:
 - stored, used and handled in a sanitary manner;
 - sufficient to completely surround and cover the meat and protect it from contamination; and
 - non-toxic (that is, the packaging should not be made of poisonous material).
- Cleaning up after Slaughtering an animal. Therefore, butchers who do not clean up in the stipulated manner after slaughtering are acting in an unlawful manner.
- For the consumer's protection, the regulation stipulates that butchers must, among other things, disinfect all equipment used in the slaughter or preparation of meat and must store the meat so as to prevent contamination and spoilage.

Producers and Traders of Rabbit Meat

Rabbit Farmers

A list of persons engaging in rabbit production was provided by the Rural Agricultural Development Authority (RADA). Additionally the list identifies, among others, major rabbit farmers in Jamaica. Telephone interviews were conducted and of that list, a total of 30 farmers, rearing a total of 1,862 rabbits were identified as being operational and willing to expand their rabbit production.

From the interviews, it was noted that most farmers do not maintain proper records and needed to rely on estimates in providing information. This prohibited the acquisition of historical production figures. However, of the 30 farmers interviewed, 40% engage in rearing rabbits for both pet and commercial meat purposes, while 60% rear rabbits solely to be sold as pets. The most popular breeds reared among farmers are the Flemish Giant, Checkered Giant and New Zealand White and Black. Although the Flemish Giant is used by some farmers for meat production, the breed is mainly sold as pet.

One major producer stated that hotels are importing rabbit meat and cited this as a reason for them not buying his product. However, as indicated earlier there has been no importation of rabbit meat from 2010. In relation to meat classification, farmers have indicated that fryers with giblets are mainly supplied to buyers. Butchering of the animal is largely done by the farmer or they commission the service of a butcher. As it relates to by-products, some farmers have indicated that the rabbit manure is used in private gardening; however no one has indicated that they use any by-product for commercial purposes.

See Appendix A for the list of rabbit farmers, farmer with abattoir, number of rabbits per farm and type of production.

Supermarkets

A total of 20 supermarkets were contacted across the island. The majority (95%), stated that currently they do not supply rabbit meat. In fact, only one supermarket said that they supplied the item, using 10 kg monthly. Two indicated an interest in supplying the commodity providing that the demand is constant. Three supermarkets stated they used to stock rabbit meat but the demand for the item was low and as such it was removed from the shelves. Those who did not or had never supplied the meat did not show an interest in doing so. See Appendix B for more information obtained.

Hotels

A random sample of 32 hotels across the island were chosen and contacted to ascertain the usage rate of rabbit meat on their menus. Iberostar, Kariba Kariba and Half Moon all admitted to having used rabbit meat on their menu, in some form, previously, but added that it was taken off as there was no demand for the meat. Currently, Half Moon hotel is now revisiting the usage of rabbit meat in their food preparation. Couples San Souci indicated that it uses the meat on a consistent basis while Hedonism II stated it only used it for small dinners occasionally, with the most recent usage being January 2014.

Couples San Souci and Hedonism II indicated that the desired specifications were fryer and giblets, and fryer only respectively. However, Hedonism II indicated that it projects that by October 2014 the hotel will use the meat on a much larger scale, providing for between 500-600 persons. In relation to quantities, the chef stated that prepared rabbit meat would either be displayed buffet style, using a total of 35 kg weekly or 10kg a la carte style weekly.

Twenty-seven (27) hotels representing 84.38% of the respondents indicated that they had never used, nor were they interested in using the meat on the menu.

The monthly usage by the sole consistent user, Hedonism II, is 20 kg. See Appendix C for more information obtained.

Restaurants

A total of 29 Restaurants Island-wide were contacted. Of this number, two restaurants indicated that they currently use rabbit meat in the preparation of meals. Both entities are jerk centres and use an average of 19.32 kg per week in their operations. The remaining restaurants, representing 93.10% did not use rabbit meat in their menu and expressed that there is no demand for the product and as such, they had no interest in using it on their menu. For additional information obtained, see Appendix D.

Caribbean Producers Jamaica Limited (CPJ)

On Friday February 7, 2014, the Jamaica Gleaner published an article entitled “CPJ considers selling rabbit meat”. The article quoted Dr David Lowe, Chief Revenue Officer saying “We are engaged in internal assessment looking at whether it is a viable commercial product to have in our portfolio compared to pork, beef or chicken. We have not actually established a presence or a market for it as yet, but it is something the market is now adjusting its taste profile and its willingness to explore as another type of protein. So, we are monitoring whether or not it will be viable over time and whether there is any scope for innovative ways to prepare it and therefore make it even more attractive than just being rabbit meat”.

Based on an interview with Dr Lowe, CPJ can now confirm that it will not be delving into that market. The demand that exist for the product represents that of a niche market and is not considered feasible.

Exploring Rabbit Meat production in Jamaica

Factors affecting viability of the rabbit meat

Limitations

(1) Selling Prices for Butchered Rabbits

Unlike crops, livestock prices generally experience more stability in the Jamaican market. The farmgate price for dressed rabbits ranges from \$1,320-\$2,640 per kilogram, with the most frequent farmgate prices being \$1,540 and \$1,760 per Kilogram. Rabbit meat is not sold in large enough volumes to attract a wholesale price tier.

Retail price for uncooked rabbit meat was recorded at one supermarket for \$2,300.10 per kilogram. Jerked rabbit is sold between \$3,300 and \$4,400 per kilogram.

(2) Cultural Attitudes

In Jamaica, rabbits are perceived as pets/rodents rather than as food items. Consequently, sociological/cultural attitudes may hinder the consumption of rabbit meat on a large-scale.

(3) Relative low demand for Rabbit meat

A random sample of 81 commercial entities was chosen to ascertain among other information, their monthly usage of rabbit meat. The sample consisted of 32 hotels, 29 restaurants and 20 supermarkets across the island. A total of eight entities indicated they either use/sell or intend to use/sell rabbit meat, putting the maximum interest for rabbit meat at 9.9% of the sample. The current usage/projected usage amount to 197.72kg monthly. Six (6) entities indicated that they sold/used the product but it didn't prove viable and they no longer have an interest in doing so, this represents 7.4% of the sample. Therefore, sixty-seven (67) or 82.7% of the sample has never used/sold and has no immediate intention to use/sell rabbit meat.

(4) Climactic conditions

Climatic conditions such as heat and rain affect the health and wellbeing of rabbits. It is important therefore to consider the effects of the tropical climate on these furry creatures as they are considered to be one of the most heat sensitive livestock species.

A rabbit's internal (rectal) body temperature is constantly at 39.1 degrees Celsius³. When the temperature reaches 35 degrees Celsius, these furry creatures become unable to regulate their body temperature causing heat prostration to set in. One report has shown that rabbits are most affected by a constantly high humidity, rather than high temperature.

Studies have shown that stress induced by high temperatures and humidity can lead to respiratory and other disorders and even sudden death⁴. Heat stress ultimately affects the mortality rate of young rabbits, and to a lesser extent mature rabbits. However, long before death sets in, there is a noticeable reduction in the quality of the meat of offspring, as well as the size of the doe's litter. This factor therefore has great potential for causing failed rabbit farms and preventative measures need to be explored thoroughly and fully implemented before investing. It is essential therefore to any future plans for the development of rabbitries in the island to implement measures allowing temperatures of 15-26 degrees Celsius to be maintained in order to ensure optimum breeding and production.

(5) Major illnesses

Diseases common among rabbits are caused by poor management of farms, including wet and/or dirty cages. Dr. Rastogi's study has highlighted some popular diseases as being diarrhoea, sores, mites and ringworm, with diarrhoea being responsible for the death of at least 20% of young rabbits before they reach marketable age and weight.

³Rastogi, R. *Take the Heat Off Your Rabbits*. (2002). Department of Food Production Faculty and Agriculture and Natural Sciences, the University of the West Indies, St. Augustine, Trinidad p. 1

⁴Rastogi, R. Faculty and Agriculture and Natural Sciences, the University of the West Indies, St. Augustine, Trinidad chapter 1

In addition, according to Dr. David J. Black, of the University of Tennessee, College of Veterinary Medicine and Dr. T. J. Lane, University of Florida College of Veterinary Medicine, there are twenty four (24) diseases which may affect rabbits (See Appendix E).

(6) Cost of Production

The cost of production for a 200 doe rabbitry was done by the Ministry of Agriculture and Fisheries, Economic Planning Unit (See Appendix F). The expected cost incurred to produce a kilogram of rabbit meat stands at \$680.59. Additionally, the 200 doe rabbitry cost of production was done to take advantage of economies of scale. If this figure is reduced, the cost of production per kilogram would become greater.

Factors affecting viability of the rabbit meat

(1) Breeding

Once conditions are sanitary and the rabbits are kept in suitable temperatures breeding should not be a problem as the rabbit's libido is naturally high. This is of course subject to other factors which may affect rabbits such as a natural deformity or disorder in the specific genus.

Medium-weight breeds are able to start breeding at 6 to 7 months old, with males maturing one month later than females. Since outward signs of heat are not always evident in mature does, a strict breeding schedule should be followed.

Typically, one buck can service about 10 does but no more than two to three times a week. The female should be placed in the male's cage, as females are territorial and are prone to fighting. Mating will most likely occur immediately, after which, the doe should be returned to her cage.

The average gestation period lasts 31 to 32 days. In preparation for the arrival of her litter, a nest box should be placed in the doe's hutch no later than twenty-eight (28) days after mating occurs. The nest box is important for the preservation of the litter as according to the American Rabbit Breeders Association (ARBA), chilling or hyperthermia is the most common cause related to death of new born rabbits.

The average commercial litter consists of 8 to 10 kits. Forty-eight hours after birth, you should observe and count the kits, removing any dead animals. Remove the nest box 5 to 21 days after birth. The young are weaned in about 30 days, so you can expect an average of five litters annually per doe. Under proper management, a good doe will continue to produce maximum-sized litters for 2 to 3 years.

Rebreeding- Evidently, rabbits can produce young much faster than chicken as the ARBA states that while in commercial ventures, it is not uncommon for does to be rebred as early as two (2) weeks after kindling or birthing. It is more common however that they are rebred when their litter is 6 weeks old or even after weaning, depending on how fast they recover from the previous litter.

Cross-breeding- This is defined as the act of mating rabbits of different breeds resulting in the creation of a hybrid. There is no harm in crossbreeding rabbits as unlike some types of animals, it does not lead to infertility among the hybrid. In fact, cross breeding is encouraged in controlled environments in a bid to obtain the ideal breed for the specific requirements.

Availability of Housing & Other Equipment

There are no discernable limitations related to the availability of equipment for starting a rabbitry as cages are basic and are usually made from wire or wood, materials which are readily available in Jamaica.

The manufacturing of cages could be a form of job provision for carpenters and other tradesmen in the island thereby benefiting the wider economy. Simple plastic containers can be

used to set automatic watering systems as well as feeding containers.

By-products of rabbits

By-products are considered to be a secondary product. In the case of rabbits, we have identified the three by-products that could prove commercially viable.

Rabbit Fur/Pelt (Hair)



The key factors to be considered when determining the quality of a rabbit's pelt is its coat type, the colour, the size and age. Three breeds of rabbits, the Rex, Statin and Silver fox, were identified as good candidates for fur as a secondary product.

The fur of a Rex rabbit is extremely plush making it the best choice for this market. This type of fur is found only on the Rex, Mini Rex, and the Velveteen Lop rabbits; however this latter breed is still under development. The Mini Rex and the Velveteen Lop are both small breeds so they do not make very efficient fur rabbits, however, with the Rex weighing on average 9 pounds, they make ideal candidates for fur as its primary product, as well as a secondary product.

The fur of the Satin is unique in its sheen, it's similar to normal fur but has a transparent hair shaft that gives it a shiny or glossy look, however, it is nowhere near as plush as a Rex coat. Satin fur is found on the Satin and the Mini Satin. As stated above, the silver fox was created for the dual purpose of meat and fur production.

There is currently no market for such a by-product in Jamaica. In the 1980's handbags and sandals was made using rabbit fur in the island. The passing of hurricane Gilbert damaged many rabbit farms and since then rabbit fur hasn't been used commercially.

It is noteworthy that the breeding time for fur rabbits is longer than that of meat rabbits as the best fur rabbits need to be fully mature, while meat rabbits are best suited for consumption at the fryer stage. Therefore, rabbits used as breeding stock would be better suited.

Charms



In some countries, rabbits are said to be connected to good luck. Feet and tails are used to create key chains and souvenirs that appeal to tourists.

Rabbit Manure



Rabbit manure is considered one of the best available. The manure is excellent as even when applied fresh, it will not 'burn' plants and is the only manure that does not need to be aged before using as fertilizer.

There is no need for the manure to be composted for it to be an excellent fertilizer, and it can be sold to gardeners or garden suppliers. Currently, the Linstead branch of the Jamaica 4-H club sells rabbit manure for \$300 per crocus bag (25kg bag are used)

The manure contains more nitrogen and phosphorus than many other. Additionally, rabbit manure can also be used as worm habitat as selected worms are able to break down the manure allowing it to appear as loose soil.

Conclusion

In Jamaica, rabbit meat is obtained from farmers across the island. Interviews conducted have shown that the supply of the product seems to exceed the demand for it. The average farmgate price per pound is high relative to other meats and the industry is also labour intensive. These factors will most likely have a significant impact on profit margins. Consequently, this niche market product would be mostly suited for backyard production maximizing the use of forages.

In order for this product to penetrate the Jamaica market in a significant way intensive marketing will have to be done:

- To reverse the two negative prevailing perceptions limiting the consumption of rabbits are (1) they are primarily used as pets and; (2) they are rodents.
- To address several issues faced by this industry, including highlighting the nutrition obtained from rabbits meat. As stated earlier, rabbit meat is high in protein, low in fat, contains less than half the calories of pork.

The viability of a business can be defined as the ability of a product or service to compete effectively and to make a profit; it is also measured by its long-term survival. The cost incurred to enter this industry coupled with the present low demand for the product has handicapped the industry in its effort to not only compete with other related industries on a meaningful level, but has also affected the size of the industry which is abundantly evident in the downsizing or exit of its major producers.

APPENDICES

APPENDIX A

List of Rabbit Farmers , Number of Rabbits per Farm and Type of Production Island Wide

Name	Location	Contact #	# of Rabbits	No. of Years in Operation	Type of Production
IAN ROBINSON	Hanover	384-5998	60	10	Pet & meat
CLEVELAND SKYERS	Hanover	489-7939	11	3	Pet
PAMELLA BROWN	Hanover	383-7905	120	1	Pet
WHITNEY HYLTON	Hanover	576-7238	6	2	Pet
Calvert Welsh	St. James	428-2499	10	2	Pet & meat
Claude Smith	St. James	587-1998	30	4	Pet & meat
Patrick Irving	St. James	446-4158	120	1	Pet & meat
Dan Kelly	St. Mary	381-0092	300	Unknown	Pet & meat
Craig Howard	St. Mary	413-9320	20	less than 1 year	Pet
Myron Doiley	St. Mary	857-4049	40	15	Pet & meat
*Craig Powell	Kgn & St. Andrew	383-4900	84	2	Pet & meat
Nathan Walters	St. Catherine	797-8847	20	23	Pet
Jenifer O'Conner	St. Catherine	867-2979	6	Unknown	Pet
Samuel Dean	Westmoreland	859-6786	70	4	Pet
Barrington Robinson	Manchester	351-7150	25	2	Pet
Hopeton Miller	President of the Wickwar Rabbitry	796-3049	75	1	Pet & meat
Handel Chamber	Manchester	421-5978	renovating	3	Pet
Nehemiah Rowe	Jamaica 4-H	859-8301	250	Unknown	Pet & meat
Toni Boyd	Manchester	963-4952	7	4	Pet
Tyrone White	Manchester	847-3332	35	5	Pet
Devon Beadle	Manchester	412-5790	30	7	Pet
Jermaine Saunders	Manchester	297-1324	20	1	Pet
Nigel Boswell	Manchester	463-7023	3	5	Pet
Onar Williams	Manchester	364-5364	180	10	Pet & meat
Dennis Pommell	Manchester	436-7705	5	2	Pet
Andrew Watson	Manchester	875-8071	20	Unknown	Pet & meat
Ryan Lumley	Manchester	433-2207	60	3	Pet
Aubry Mclue	St. Catherine	453-7863	50	4	Pet
Delva Roye	Manchester	287-7546	35	Unknown	Pet
Everton Brown	Hanover	868-2985	170	6	Pet & meat

*Owns an Abattoir

Source: Demand for Rabbit meat survey islandwide, Agricultural Service Unit, June 2014

APPENDIX B
Supermarket Demand for Rabbit Meat

	Name of Supermarket	Contact Person/Dept.	Contact #	Parish	Comments
1	CARIHOME	Mr. Yapp	969-5791-2	Kingston(Kgn)	This supermarket does not stock the meat, however, customers have asked for the meat and the supermarket is interested in stocking the item but needs to be trained in rabbit meat management.
2	Public Supermarket	Mr. Allen Fernandez	925-6409 925-4336	Kingston	This supermarket has never stocked nor is it interested in doing so.
3	PriceSmart Membership Shopping Club	Mrs. Donna Ford	969-1242 925-4256	Kingston	The meat isn't currently sold by this club however, there is indication that if the consumer demand is right and it is able to obtain the meat according to its requirement, it would venture into this business.
4	Hi-Lo Food Store	Ms. Stephanie Salmon	974-0903	St. Ann	This supermarket has never stocked nor is it interested in doing so.
5	Loshusan Supermarket	Mr. Joe Edwards	946-1680 978-9071	Kingston	The meat retails here for \$2300.10 per kg, monthly usage is less than 10 kg.
6	MegaMart Wholesale Club	Meat Dept.	969-3042	Kingston	This supermarket has never stocked nor is it interested in doing so.
7	John R Wong Supermarket	Mr. Luthan Wittley	926-4811 926-5798	New Kingston	This supermarkets has previously stocked the meat however, it was not viable
8	Empire Supermarket	Meat Dept.	970-2496	Kgn/Liguanea	This supermarket has never stocked nor is it interested in doing so.
9	Shopper's Fair Supermarket	Ms. Monique France	938-7405	Harbour View	This supermarket has never stocked nor is it interested in doing so.
10	Brooklyn Supermarket	Meat Dept.	926-4147	Kgn/Twin Gates	This supermarkets has never stocked nor is it interested in doing so

	Name of Supermarket	Contact Person/Dept.	Contact #	Parish	Comments
11	Michi Supercenter	Mr. Fletcher	969-3333	Kingston	This supermarkets has previously stocked the meat however, it was not viable
12	MegaMart Wholesale Club	Ms. Susan	971-7701	St. James	This supermarkets has previously stocked the meat however, it was not viable
13	Hi-Lo Food Store	Mr. Kenroy Campbell	994-9877	St Mary	This supermarkets has never stocked nor is it interested in doing so
14	Hi-Lo Food Store	Mr. Leonard Tinglin	957-4544	Westmoreland	This supermarkets has never stocked nor is it interested in doing so
15	Joong	Mr. Ouna	988-5210	St. Catherine	This supermarkets has never stocked nor is it interested in doing so
16	Shopper's Fair Supermarket	Meat Dept.	625-1283	Manchester	This supermarkets has never stocked nor is it interested in doing so
17	J. R's Bargain World	Mrs. K. Raymond	902-6880	Clarendon	This supermarkets has never stocked nor is it interested in doing so
18	S' Mart Supermarket	Ms. Marion	984-7451	St. Catherine	This supermarkets has never stocked nor is it interested in doing so
19	Kamal's Supermarket & Cambio	Ms. Nadine	993-2756	Portland	This supermarkets has never stocked nor is it interested in doing so
20	Sunburst Supermarket	Mr. Ivan	617-5390	Trelawny	This supermarkets has never stocked nor is it interested in doing so

Source: Demand for Rabbit meat survey in Supermarkets island wide, Agricultural Service Unit, June 2014

APPENDIX C
Hotel Demand for Rabbit Meat

	Name of Hotel	Contact Person/ Department	Parish	Contact #	Monthly Usage	Meat Specification	Comments
1	Hotel Versailles	Lisa Duff	Clarendon	986-2775-6			This item has never been used on the menu and there is no demand for it.
2	Grand Palladium Jamaica & Lady Hamilton Resorts & Spa	Judith Scott	Hanover	620-0000			This item has never been used on the menu and there is no demand for it.
3	Kariba Kariba	Derrick O'Conner	Manchester	962-8006			Small bed & breakfast. It does not have a restaurant but if customers request the meat it can be ordered. In the past it has been used but personnel not able to give specification. Suppliers were backyard farmers.
4	Mandeville Hotel	Rachael	Manchester	962-2460			This item has never been used on the menu and there is no demand for it
5	Mandevview Flats	Clarence Myers	Manchester	961-8439			This item has never been used on the menu and there is no demand for it
6	Trident Villas	Byron	Portland	633-7000			This item has never been used on the menu and there is no demand for it
7	Jamaica Palace Hotel	Dionne Cranston	Portland	993-7720			This item has never been used on the menu and there is no demand for it

	Name of Hotel	Contact Person/ Department	Parish	Contact #	Monthly Usage	Meat Specification	Comments
8	Terra Nova	Kerry-Ann – kitchen	St Andrew	926-2211			This item has never been used on the menu and there is no demand for it
9	Strawberry Hill	Nicole Bailey	St Andrew	944-8400			This item has never been used on the menu and there is no demand for it
10	Jamaica Pegasus Hotel	Nika Fuller	St Andrew	926-3690			This item has never been used on the menu and there is no demand for it
11	Medallion Hall Hotel	Camille Powell	St Andrew	927-5721			This item has never been used on the menu and there is no demand for it. That meat is strange to us.
12	Knutsford Court Hotel	Deidre Brown	St Andrew	926-3690 929-1000			This item has never been used on the menu; however there is some indication that the hotel may be willing to use the item depending on its cost.
13	Couples San Souci	Maureen Lewis-Chef	St Ann	994-1206	20kg	Fryers & giblets. Meat preferred frozen	The meat is used in stews.
14	Jewel Resorts	Chavoy	St Ann	972-7400			This item has never been used on the menu and there is no demand for it.
15	Breezes - Runaway Bay	Purchasing Department	St Ann	973-6099			This item has never been used on the menu and there is no demand for it

	Name of Hotel	Contact Person/ Department	Parish	Contact #	Monthly Usage	Meat Specification	Comments
16	Cardiff Hotel & Spa	Devon Bennet	St Ann	973-6671			This item has never been used on the menu and there is no demand for it
17	Waterloo The Penthouse	Chevon Wright	St Elizabeth	965-2278			This item has never been used on the menu and there is no demand for it
18	Sunset Resorts	Ms. Lois Brown - Purchasing Manager	St James	979-8800			This item has never been used on the menu and there is no demand for it
19	Holiday Inn Sunspreet Resort Montego Bay	Mr. Foster	St James	953-2484			This item has never been used on the menu and there is no demand for it
20	Sandal Royal Caribbean	Purchasing Department	St James	953-2231			This item has never been used on the menu and there is no demand for it
21	Iberostar	Purchasing Department	St James	680-0000			This item was previously used on the menu however, it was taken off and there is no interest in using it again
22	Half Moon	Mrs. Shawna Nesbeth - Purchasing Manager	St James	953-2211			This item was previously used on the menu however, it was taken off and they are currently in the process revisiting the usage of the meat.
23	Casa Maria Hotel	Angie Green	St Mary	725-0157			This item has never been used on the menu and there is no demand for it.

	Name of Hotel	Contact Person/ Department	Parish	Contact #	Monthly Usage	Meat Specification	Comments
24	Whitfield Hall Hostel & Farm	John Algrove	St Thomas	927-0986			Meals are provided for guests at their request however there is no demand for rabbit meat.
25	Golden Shore Resort Ltd	Raquel Hinds	St Thomas	982-9657			This item has never been used on the menu and there is no demand for it.
26	FDR Pebbles	Tamara Morrison	Trelawny	973-4591-5			This item has never been used on the menu and there is no demand for it.
27	Hedonism II	Chef Miller	Westmoreland	957-5200		Fryers are used for small meals, however a mixture of fryer and roasters are anticipated to be used in the future and is dependent on the supply. Meat is preferred chill as oppose to frozen	The meat is used sometimes on the menu for small dinners. The last time it was used was January 2014. The Chef has indicated that he has asked for prices and is looking to order the meat on a large scale to provide for between 500-600 people. When converted into kilogram its usage is 35kg buffet style or 10kg a la carte style weekly according to the chef. Whether the hotel will use the meat is dependent on the price and supply.

	Name of Hotel	Contact Person/ Department	Parish	Contact #	Monthly Usage	Meat Specification	Comments
28	Couples Negril	Carlene Christie (PM)	Westmoreland	957-5960			This item has never been used on the menu and there is no demand for it.
29	Sandals Whitehouse European Village & Spa	Purchase Dept. Mr Andre Harris	Westmoreland	640-3000			This item has never been used on the menu and there is no demand for it.
30	Spanish Court Hotel	Mr Gentles	Kingston	618-6000			This item has never been used on the menu and there is no demand for it.
31	ClubHotel Riu Ocho Rios	Mr Miroslav	St. Ann	972-2200			This item has never been used on the menu and there is no demand for it
32	Fun Holiday Beach Hotel	Ms. Chung	Westmoreland	957-3585 479-6644			This item has never been used on the menu and there is no demand for it.

Source: Demand for Rabbit meat survey in Hotels island wide, Agricultural Service Unit, June 2014

APPENDIX D
List of Restaurants

	Name of Restaurants	Contact #	Location	Comments
1	Bamboo Garden Restaurant	962-4515	Mandeville	Not interested in using this on the menu
2	Bloomfield Great House	962-7130	Mandeville	Not interested in using this on the menu
3	China Delight	962-9560	Mandeville	Not interested in using this on the menu
4	OMG Restaurant	962-6529	Mandeville	Not interested in using this on the menu
5	China House Restaurant	979-0056	Montego Bay	Not interested in using this on the menu
6	On the Water Front	952-2452	Montego Bay	Not interested in using this on the menu
7	Dragon Court Restaurant	979-8822	Ocho Rios	Not interested in using this on the menu
8	Hong Kong Restaurant	974-0588	Ocho Rios	Not interested in using this on the menu
9	Ocho Rios Village Jerk Centre	974-2549	Ocho Rios	Not interested in using this on the menu
10	Ruins at the Falls	974-8888	Ocho Rios	Not interested in using this on the menu
11	Twisted Kilt	952-9488	St. James	Not interested in using this on the menu
12	Jamaica Tamboo	957-4282	Westmoreland	Not interested in using this on the menu
13	Evita's Italian Restaurant	974-2333	Ocho Rios	Not interested in using this on the menu
14	FJ's Restaurant & Jerk Centre	961-4380	Mandeville	Not interested in using this on the menu
15	Jerky's Bar & Grill	684-9101	Montego Bay	Not interested in using this on the menu
16	Prakash Restaurant Ind & Thai Cuisine	953-2861	Montego Bay	Not interested in using this on the menu
17	China Express	906-9158	Kingston	Not interested in using this on the menu
18	Jade Garden Restaurant	978-3476	Kingston	Not interested in using this on the menu
19	Golden Gate Restaurant	977-7552	Kingston	Not interested in using this on the menu
20	TGI Fridays	978-8443	Kingston	Not interested in using this on the menu
21	Sweetwood Jerk Joint	906-4854	Kingston	The meat retails here for \$1,800/lb. It is jerked and sold only on Fridays and Saturdays. Currently about 50lbs (fryers and giblets) are used per week and the demand for the meat is steadily growing, however, in order to make a profit, the proprietor believes that an increase in the retail price is necessary.
22	A-Bar Restaurant & lounge	631-4194	Kingston	
23	Restaurant Mille Fleurs	993-7267	Port Antonio	Not interested in using this on the menu
24	Jo-Jo's Jerk Centre	906-1612	Kingston	Not interested in using this on the menu
25	Murray's Jerk	367-4967	Clarendon	The meat retails for \$2,000/lb. and is sold daily. Takes 45-60 minutes to jerk. The meat is purchased for \$600/lb. (Fryer). About 35lbs of the meat is sold per week.

	Name of Restaurants	Contact #	Location	Comments
26	Farmer's Jerk Centre		Old Harbour	Not interested in using this on the menu. It is too expensive.
27	Gino Italian Restaurant	957-4918	Westmoreland	Not interested in using this on the menu
28	Jack Sprat Restaurant	965-3583	St. Elizabeth	Not interested in using this on the menu
29	Scotchies Tree	906-0602	Kingston	Not interested in using this on the menu

Source: Demand for Rabbit meat survey in Restaurants Island wide, Agricultural Service Unit, June 2014

APPENDIX E
List of Common Diseases

Disease	Cause	Symptoms	Prevention	Treatment
Abscesses	Bacterial infection.	Enlargements under skin near jaw. Can occur on other parts of body where there are wounds or scratches.	Minimize fighting. Eliminate sharp objects that can injure the rabbit.	Clip the fur around abscess, then lance and remove the pus. Disinfect with peroxide and use an approved antibiotic ointment or powder to promote healing
Caked Mammary Gland	Milk production is in excess of utilization. Too few young or the young are not nursing.	One or more of the mammary glands may become swollen, hot and firm. Often mistaken for mastitis.	Reduce ration by one-half the day the doe kindles and gradually increase to full feed in 7 days.	Relieve some congestion by partial milking. Massage gland with an anti-inflammatory ointment.
Coccidiosis	Five different species of protozoa (<i>one celled animals</i>) can injure the bile ducts, intestines or cecum.	Affects primarily young rabbits. In severe cases, symptoms are diarrhoea, loss of flesh, pot belly, loss of appetite, rough fur coat.	Keep pens clean and prevent fecal contamination of feed and water. Use wire floor pens.	Sulfaquinoxaline in food or drinking water continuously for 2-weeks.
Conjunctivitis "Weepy Eye"	Inflammation of eye lid. Can result from irritation by dust, sprays, fumes or by bacterial infection.	Excessive tear formation and fluid runs down cheek. Rabbit rubs eyes with its front feet which further aggravates the condition. Rabbits with snuffles frequently have "weepy eye".	Minimize sources (dust, dirt) of irritation. Remove chronically affected rabbits.	Use a commercial eye-washing product to remove dust, dirt or other foreign object. If inflammation persists, an ophthalmic ointment containing antibiotics may be helpful.
Ear Canker	Ear mite	Scabs or a crust start forming at base of inner ear. Mites cause considerable irritation and rabbit will shake its head and try to scratch ears with hind feet.	Do not let unaffected rabbits in contact with rabbits that have ear canker.	Use a cotton swab to apply mineral, vegetable or olive oil over all visible crust. Usually one or two treatments is sufficient.
Enteritis: Diarrhea	Likely caused by coccidiosis or other intestinal inflammation. In young rabbits excessive "greens" will cause diarrhoea	Watery diarrhoea may be only symptom.	Develop a program to control coccidiosis. Do not feed "greens" to rabbits.	Keep rabbits comfortable and encourage feed consumption. A medicated or vitamin fortified feed may be helpful.
Mucoid	Thought to result from an irritant, a toxin or other stress factors such as dietary changes, antibiotics and travel stresses. Not thought to be contagious.	Characterized by sub-normal body temperature, loss of appetite, tooth grinding depression, rough fur coat, dehydration, bloated abdomen and diarrhoea containing mucus material.	Prevent or reduce stress factors and have strict sanitation of hutches, feeding and watering equipment.	No successful treatment known, but mortality may be slightly reduced by feeding a medicated or vitamin fortified food. Eliminate all affected rabbits, and purchase breeding stock that are free of the disease.
Eye Infection	Several types of bacteria.	The eyes of baby rabbits may stick shut and pus around the eyes may be noticed.	Prevent cold drafts and other stress conditions.	Apply an antibacterial ophthalmic eye ointment.

Disease	Cause	Symptoms	Prevention	Treatment
Fur Block "Hair Ball"	Rabbit ingests a large amount of its own hair or that from another rabbit in a short period of time.	Rabbit will sporadically eat small amounts of feed. A firm mass can be palpated in the stomach.	Fur block is noted more often in Angora rabbits.	An oral dose of 1/2 oz. mineral oil may be effective. If the fur block is too large, surgical removal is necessary.
Fungus Infection	Fungus	A dry scaly skin (dandruff) on the shoulders and back.	Prevent contact with affected rabbits.	Apply tolnaftate to affected area. Other medications are available.
Heat Exhaustion	Excessively high temperatures (above 85 ⁰ F) and high humidity (above 70%), obesity, poor ventilation, insufficient water and crowding.	Increased respiration rate (panting) prostration, and excessive saliva discharge. Pregnant does and young in the nest box are most susceptible.	Provide shade, adequate air movement, and plenty of cool water on a hot day. Wet burlap in cage will aid in cooling.	Rabbits suffering from heat exhaustion can be immersed in lukewarm water to reduce body temperature to the normal 101-104 ⁰ F. Apply a cool compress to the ears.
Hutch Burn	Usually associated with wet and dirty hutches. Urine and faecal material cause the skin to become irritated and infected.	Usually, a brownish crust covers the infected area and a bleeding exudate may be seen.	Do not allow faecal material to accumulate in the hutch.	Clean affected skin with a germicidal soap and keep the area clean.
Ketosis	Obesity, large litter, lack of exercise.	Usually occurs just before or just after kindling. Does go off feed and will not eat.	Prevent young does from getting too fat and make sure the does are eating at kindling time.	Obesity can be prevented by limiting feed to 4 to 6 oz. daily for does.
Mastitis "Blue Breast"	A bacterial infection in the mammary gland caused by an injury from nest box, cage or a bite from nursing young.	The mammary gland will become red in colour, swollen, tender and dark blue streaks may appear.	Reduce any chance of injury to mammary gland as the doe enters the nest box. Do not transfer the young to another lactating doe.	Penicillin is effective against staphylococcus or streptococcus organisms.
Malocclusion "Buck teeth"	An inherited condition characterized by excessive growth of the front teeth.	Lower teeth protrude and upper teeth curve into the mouth.	Do not use rabbits with "buck teeth" for breeding purposes.	Teeth on young rabbits can be trimmed until they reach slaughter weight.
Pastaurellosis "Snuffles"	A chronic upper respiratory ailment caused by bacterial infection.	Typical early signs are a nasal discharge, watery eyes, head shaking, sneezing or rattling noise in breathing and a loss of weight. Continual infection may cause rabbits to become sterile.	Quarantine all new rabbits for a 3 week period. Cull rabbits that show continuous chronic symptoms of the disease. Reduce stress factors and have good management and sanitation practices.	Tetracycline in feed may be effective in an uncomplicated case. For accurate treatment, the organism needs to be cultured and identified.
Pneumonia	A bacteria or virus infection usually associated with other respiratory diseases or stress factors such as damp, drafty and unsanitary hutches.	Elevated temperature, laboured breathing, nasal discharge and loss of appetite are symptoms.	Control of "Snuffles" reduces chances of pneumonia. Eliminate drafts and wet conditions.	Treatment may vary depending upon the causative agent. A broad spectrum antibiotic may be helpful.

Disease	Cause	Symptoms	Prevention	Treatment
Ringworm	A fungus infection that can appear on any part of the body but most often will occur on the head. This fungus infection can be transmitted to humans.	Loss of hair in circular patches. A yellowish crust forms and sloughs off in about 3 weeks. If infection goes untreated, considerable scratching will occur.	Do not allow infected rabbit in contact with other rabbits. Wear gloves when handling the infected rabbit.	Clip the fur around affected area and treat with toinaftate. Other medications are available.
Salmonellosis "Scours"	Several members of the Salmonella group of bacteria can affect rabbits.	General symptoms are diarrhoea, loss of weight, conjunctivitis, and rapid breathing	Good husbandry practices and a quarantine of new rabbits.	Tetracycline in the feed may be effective.
Skin Mange	An infestation of mites that burrow through the skin and cause considerable irritation. Mange mites that affect dogs and cats can infect rabbits.	There will be some loss of hair, scaly skin and intense itching and scratching.	Infected rabbits should be separated and treated. The premises should be disinfected	Dust with an insecticide approved for the purpose. Treatment should be repeated in 7-days.
Sore Hocks	A bruised or infected area on the under surface of the hock joint. Related stress factors are a dirty hutch, rough surfaces on the floor, or a floor constructed with the wrong size wire-grid.	Scabs usually appear on the bottom of the rear feet. Pad and toes of the front feet may become infected. Nervous and heavy rabbits are more susceptible to the sore hock condition.	Do not let wet litter and manure accumulate. Eliminate sharp objects on the floor.	Wash the hock with a germicidal soap and apply an antiseptic such as tincture of iodine.
Spirochetosis "Vent Disease"	Infection by a spirochete and can be transmitted by mating.	Blisters or scabs occur on the sex glands.	Always check the breeders before mating. Isolate all new rabbits.	Injection of penicillin is the best treatment. Do not breed until all lesions disappear.
Tyzzers Disease	A bacterial infection usually associated with stress conditions and poor sanitation.	The acute form results with diarrhoea, dehydration and death within 48 hours.	The best preventative measures are clean stock and good husbandry practices.	Treatment with antibiotics is not very effective.
Warbles	The growth of the botfly larvae under the skin	Warbles can be observed as enlargements under the skin with a small hole in the center. The condition is painful and the rabbit may lick the area.	Screen the area to keep the botfly away from the rabbit.	Remove the larvae without crushing it. Clean the wound with a germicidal soap or apply an antibiotic powder or ointment to prevent infection.

*Ask your local veterinarian for dosage levels when using antibiotics and for names of antibiotic powders and ointments.

**When antibiotics are a part of the treatment program, follow the withdrawal period of the medication before the animal is slaughtered for food.

**This information on diseases and treatment was reviewed by Dr. David J. Black, University of Tennessee, College of Veterinary Medicine; and by Dr. T. J. Lane, University of Florida College of Veterinary Medicine.

APPENDIX F
Cost of Production

200 Doe Rabbitry			
	Qty	\$/Unit	Total \$
Slaughtering House/Cold Storage	1.00	1,500,000.00	1,500,000.00
Cages			
Does	200.00	6,500.00	1,300,000.00
Bucks	20.00	5,500.00	110,000.00
Fryer and replacement	160.00	5,500.00	880,000.00
Nipple Waterers	390.00	1,200.00	468,000.00
Feeders	390.00	800.00	312,000.00
Water tank	1.00	45,000.00	45,000.00
Plumbing Fixtures	1.00	25,000.00	25,000.00
Electrical Fixtures	1.00	40,000.00	40,000.00
Nest Boxes	150.00	900.00	135,000.00
Total			4,815,000.00
Depreciation 10%			481,500.00
Breeding Stock			
Does	200.00	3,000.00	600,000.00
Bucks	20.00	3,000.00	60,000.00
Feed (25kg bags)	2,830.00	1,370.00	3,877,100.00
Medication	12.00	2,000.00	24,000.00
Water	12.00	5,000.00	60,000.00
Electricity	12.00	12,000.00	144,000.00
Labour	365.00	2,000.00	730,000.00
Slaughtering/Packaging	52.00	10,000.00	520,000.00
Subtotal			6,015,100.00
Total			6,496,600.00
Production (lbs)	21,000.00		
COP \$/lb	309.36		

Source: MOAF, Economic Planning

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