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# CARIBBEAN FOOD CROPS SOCIETY

**34<sup>th</sup> Annual Meeting 1998**

**Rural Agricultural Development Authority  
Ministry of Agriculture, Jamaica**

*“Enhancing Regional Food Security and Exports  
by Integrating National Strategies”*

**JAMAICA**

**VOL. XXXIV**

## **LAYING THE FOUNDATION FOR GENETIC IMPROVEMENT OF THE JAMAICAN GOAT: SELECTION AND PERFORMANCE OF IMPORTED BOER GOAT SEED STOCK**

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### **ABSTRACT**

Consumers are demanding high quality leaner meat at lower prices. Demand for meat that is tender, low in fat, and low in cholesterol is forcing livestock producers to look to genetics for the challenge. Over the past five years goat producers throughout the United States have been using the South African Boer goat extensively to improve the meat quality and productivity of the Spanish, Angora, and Tennessee Stiff-legged herds. The Boer goat has adapted very well to a variety of environmental conditions, ranging from hot, dry semi-arid to humid and tropical bush. The Boer goat has the necessary characteristics which include size, uniform carcass, fast growth rates, high reproductive rates and long breeding season. They are good foragers, good milkers, and have excellent mothering ability. A characteristic feature of the Boer goat is a large frame with either solid or red markings or white hair and red markings on the head and neck. Mature animals weigh between 180-280 lbs for males and 110-165 lbs for females.

Cross breeding experiments are being conducted using the Boer, Jamaica Creole, and graded Nubians. There are several critical factors to consider when embarking on a cross breeding program. These include criteria for selecting seed stock for the foundation herd, selecting a herd sire, management, and environmental conditions under which the animals will exist. This study is a summary of the selection, processing, importation, and performance of imported Boer goat seed stock that will form the genetic base for the improvement of the Jamaican goat. Imported Boer goats were evaluated to determine the performance of this animal under Jamaican tropical management conditions.

### **INTRODUCTION**

Goat meat is considered a delicacy and is the most consumed red meat in Jamaica when it is available. The supply of goat meat generated by domestic production has not met the demand by consumers. Seventy-six (76%) percent of goat meat consumed is imported from New Zealand and Australia. The goat industry in Jamaica is still considered to be a small farm enterprise contributing to the livelihood of some 27,000 farmers (Miller et al., 1996).

Despite the large volume of goat producers and a local production of 0.82 million kilograms of goat meat each year Jamaica continues to import over 1.2 million kilograms of goat meat and mutton at an annual cost of JAS\$22.1 million. According to Miller et al., (1996) a number of constraints has contributed to the slow growth of the industry. These factors include: low productivity of the native goat, lack of improved technical service in the area of health, breeding, nutrition, disease and health problems associated with imported goats, lack of artificial insemination service for goats, and a high incidence of praedial larceny.

The introduction of the Boer goat to Jamaica is of paramount importance in upgrading the local goat population.

Many countries throughout the world have recognized the potential of the Boer goat for its improvement in growth performance, carcass yield, and meat quality in their local goats (Dahl, 1995, Newton, 1995, Shelton, 1990). The objective of this research project is to provide the highest quality Boer goat genetics to the Jamaican Ministry of Agriculture (Bodles Experiment Station) and the Jamaican small stock producers to improve the genetic quality and performance of the Creole and Nubian cross bred Jamaican goats. This study is also designed to evaluate the performance of imported Boer goats and Boer goat semen into Jamaica and to determine the potential for use in crossbreeding programs to improve the native goat productivity.

## **IMPORTATION OF BOER GOATS**

### **The Route of the Boer Goat from Africa to Jamaica**

The eventual landing of the Boer goat genetics in Jamaica in 1996 greeted the industry with great enthusiasm. The initial importation of semen and live animals had their original roots in the form of embryos which were collected in Zimbabwe in 1987. South African Angora goats were the main animals which were collected for embryos. A few South African Boer goats were included in the agreement which was a part of a New Zealand project to bring in new fiber and meat goat genetics. The plan called for all the embryos to be transferred to waiting recipient females which were to be maintained in long term quarantine. Two approved quarantine facilities were able to start the program at that time. One operated by Landcorp, Ltd and the other by Dr. Rob Moodie under the name African Goat Flocks, Ltd. Embryos were transferred and Boer goat kids were born five months later. Boer goats shipped to Canada originated from the same group of embryos through an agreement between Landcorp and Olds University in 1992. All animals born then served as seed stock for proliferation of fullblood boer numbers. After five years of quarantine, the original animals born were sacrificed and all tissues inspected and tested for various diseases. Having passed this hurdle, all other animals which were born from these initial animals were then able to be released from quarantine. Thus, in 1993, both Landcorp and African Goat Flocks offered their stock for sale in the United States. This started the large scale importation of Boers into the United States. The Canadian Agricultural Ministry modified and adopted their importation protocol to directly import South African Boer embryos from South Africa. South African Boer goat Genetics were imported from Canada to the United States. After a few years of selection, these genetics found their way into Jamaica by an agreement between Prairie View A&M University and the Jamaican Ministry of Agriculture. The first shipment occurred in November 1996.

### **Sire and Dam Selecting**

Two hundred purebred Boer bucks and one hundred and fifteen purebred Boer does were evaluated on several Texas Goat Ranches to select breeding stock for the Bodles experiment station and the Jamaican goat producers. Fifteen (15) full blooded Boer bucks between the age of 5 and 8 months old were selected, and 4 purebred Boer females between the ages of 4 months to 1 year were the first group selected on the basis of breed type characteristics, structural correctness, volume, capacity, musculling, breed, sex characteristics, frame size, color markings, size for age, body weight, testicular conformation, soundness in mouth, number of teats (Campbell, 1984, Castleberry, 1995). Records were examined to determine time and frequency of kidding, number of offsprings born and weaned and growth rate of offspring. After the first shipment forty seven (47) mature bucks and thirty (30) does were selected and shipped into Jamaica. A few purebred animals were shipped in from Canada later.

### **Health Testing**

All animals were selected with evidence of good health, physical soundness, and free from clinical signs of diseases including Caseous lymphadenitis (CL), Caprine Arthritis Encephalitis (CAEV) and Scrapies. Serum samples were then taken from each individual animal and tested for CAEV, *Brucellosis melitensis*, *Brucella abortus*, Leptospirosis (PICGH), and Tuberculosis. Goats were vaccinated against haemorrhagic septicemia, *Clostridium septicum*, and *Clostridium chauveii*. Animals were examined and treated for external parasites and dewormed for internal parasites.

## Quarantine and Shipment

All animals selected for export to Jamaica were isolated and grouped according to sex, size, and body weight. They were fed high quality hay and water ad lib. They were observed over a one week period while awaiting final test results. The selected animals were loaded on to a trailer and taken on a two day drive to Florida where they were quarantined at the United States Department of Agriculture Animal and Plant Inspection Service (USDA/APHIS) Miami International Airport. After inspection, the animals were loaded into crates and shipped by air to Jamaica. Immediately after arrival into Jamaica the animals were unloaded watered, fed, and quarantined at the airport facilities for two to three weeks. All animals were inspected by a board certified veterinary officer during the duration of the quarantine.

## Acclimatization of animals

Once the animals left the quarantine station at Norman Manley International Airport they were distributed to the research station and to the local farmers. The animals were weighed and fed hay and a local concentrate feed. Table 1. represent the genetic pedigree of fifteen bucks and twelve does imported in late 1996 and early 1997.

**Table 1. Pedigree of 5-8 Months of Age Boer Goats Exported to Jamaica.**

Parents	Imported Bucks	Parents	Imported does
Sire: K554/93 Dam: 92016 (Minnie Pearl)	305B	Sire: 5401 (bubba) Dam: 42034(156/91)	H26
Sire: 58002(Big Mac) Dam: 26000/(64G)	99G	Sire: 42030(G10) Dam: 81087	H20
Sire: 53007 (Mustang) Dam: 25133(4488)	55G	Sire: 2440022 (Inglis6) Dam: 086033 (113 one-thurdeen)	H06
Sire: 53007 (Mustang) Dam: 26004(54G)	57G	Sire: 43115(Botha Ennobled) Dam: 49008	H190
Sire: 45014 (Jenkins Dam 64039	115G1	Sire: 86013(89 Rambo) Dam: 086017(ww227)	J77
Sire: 243155 (Botha Ennobled) Dam: 249008	H191	Sire: 86013(89Rambo) Dam: 047004Rudy	J107
Sire: 92003 (In Genesis) Dam: 92002 (Capragen 31/93)	H01	Sire: 41021(21) Dam: 41019(92)	279B
Sire: 63007 (Mustang) Dam: 26004 (54G)	71G	Sire: 21011 (Jake) Dam: 58012	241B
Sire: 243155 (Botha Ennobled) Dam: 240070	H185	Sire: 86013(89Rambo) Dam: Nubelle	H95
Sire: 8601(w1274 Joe) Dam: 47003	J11	Sire: 49060(AGF 439) Dam: SP9	Sandra 9
Sire: 98304 (Fred) Dam: 34123 (Homelite)	J40	Sire: 49060(AGF 439) Dam: SP10	Sara 10
Sire: 249060 (439) Dam: SP12	Stacy	Sire: 49060(AGF 439) Dam: SP22	Music 22
Sire: 98304 (Fred) Dam: 34119 (Hedda)	J66	Sire: Reg Dam: Reg	H4
Sire: Reg Dam: Reg	J60	Sire: Reg Dam: Reg	H45
Sire: 44022 (Inglis) Dam: 55033 (Myriad)	H86	Sire: Reg Dam: Reg	H49

**Table 2. Growth Rate of Imported Purebred Boer Bucks (5-8) months old over a 30 day period December 31, 1996 to January 30, 1997.**

Animal ID #	Weight A (lbs)	Weight B (lbs)	Number of days	Growth Rate (lbs)
305	108	122	30	14
099	068	086	30	18
241	090	116	30	26
185	060	076	30	16
190	060	078	30	18
191	068	088	30	20
H26	096	120	30	24
115	078	092	30	14
H20	096	126	30	30
071	072	090	30	18
107	090	108	30	18
999	104	112	30	08
279	090	112	30	22
H01	098	126	30	28

Mean weight A = 84.1 lbs; Mean weight B = 103.7 lbs; Growth rate 19.05 lbs; T prob>.0001

**Table 3. Average Weights of Boer Goats in Jamaica 1997.**

	Buck	Does
<b>Yearling Boer</b> (age range in age = 8-15 months)	170 n=20	120 n=14
<b>Mature Boer</b> (age range in age = 2-5 years)	260 n=16	170 n=8

### Adaptability

Preliminary Data Indicate that the Boer goats adapted well to the tropical climate of Jamaica. They were heat tolerant and appear to be similar with respect to disease resistance of the native goat.

Adaptation was measured by feed consumption, weight gain, and reproduction performance. Yearling imported Boer bucks averaged 19.5 lbs. per month for the first 3 months after arriving on the island (Table 2). They displayed typical breeding behavior, were aggressive and used for breeding to local creole goats. Mature bucks averaged 260 lbs. while the mature does average 170 lbs. Yearling bucks average weight was 170 lbs. and does weighed 120 lbs (Table 3).

### Fertility and Reproduction

All Boer bucks were fertile except for one. They were all used to crossbreed the native Jamaican goat and graded Nubian. Conception rate was as high as 95% on some farms. Although the nutritional needs of the Boers vary from farm to farm nutrition did not seem to affect breeding and conception rate. The young females reached puberty at seven (7) months of age and may have bred early during the time of adjustment to the new tropical environment. The average female gave birth to twins.

### Nutrition and Growth

The Boers were constantly feeding compared to the native Creole and Nubian goats which account for the increase in weight gain.

## CONCLUSION

The Jamaica goat industry is potentially a 50 million Jamaican dollar per year industry, when one consider income for small farm families, impact on the feed industry, supermarket, hotels, and restaurants, the festive demand and home consumption needs for goat meat. The exact dollar amount is difficult to determine because most of the goats are slaughtered in back yards without inspection or documentation. Current agricultural emphasis in developing countries is agricultural diversification, sustainability and the need for healthier meats.

The partnership between Prairie View A&M University, the Jamaica Ministry of Agriculture, and the goat producers have seen significant activities in the importation of Boer seed stock for cross breeding programs. The potential for expanded meat goat production and marketing has never been more favorable in Jamaica. The goat industry over the past two years is the fastest growing agricultural industry. In order to ensure profitability for goat producers on the island and to address the increasing demand for "Chevron or mutton" breeding stock must be subjected to selective pressures to improve genetics and productive traits. In addition to marketing and infrastructure development, emphasis must be placed on genetics, health, nutrition, management and value added products. The importation of over 170 Boers between 1996 and 1997 has provided the country with high quality Boers as foundation stock for genetic improvement of the local goats. The imported Boer goats from Texas has adapted well to the tropical environment as demonstrated by growth, body weight, and reproductive efficiency

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