8. ANIMAL PRODUCTION AND RESEARCH IN SRI LANKA

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The development of livestock production in general and dairy production in particular, has been given very high priority in the Sri Lanka Government's current 5 Year Plan (1972–77). Programmes are being implemented towards increasing the domestic milk production so as to replace all imports of milk powder and raise the output of butter and other milk products. The supply of meat is to be increased by multiplication of existing herds and improving their carcase weights.

There is a need to increase the amount of protein consumed in the diet of Sri Lanka's population and a large part of this protein must be of animal origin. Although the calorie consumption is only slightly below minimum requirements, both the total daily protein consumption (estimated at 1.6 ozs.) and the animal protein consumption (estimated at 0.25 ozs.) are among the lowest in the world.

The present levels of consumption of milk, meat and eggs per year of the average Ceylonese is far from adequate and are as follows:

I	Milk	45.6 lbs.
II	Meat	7.6 lbs.
	(a) Beef	5 lbs.
	(b) Mutton	1.17 lbs.
	(c) Pig meat	0.73 lbs.
	(d) Chicken	0.70 lbs.
III	Eggs	2.05 lbs. (22 eggs)

These consumption rates are extremely low by Western standards where an average person consumes about 20 ozs. of milk per day and 152 lbs. of meat and 250 eggs per annum. To meet the proper nutritional requirements of our people it will be necessary to increase the present levels of consumption. This difficult task can be achieved if the vast animal and land resources are properly harnessed and utilized in the programmes for develeopment of animal production. Although it will be several years before the required nutritional levels of consumption of milk meat and eggs are reached, it has become vitally important at this stage that we produce as soon as possible in our country, those animal products which we have been importing at a high cost of foreign exchange.

In the past the dairy industry was not fully developed. Almost half of the present milk consumption is provided by imports valued at about U.S.$11 million per annum. Taking into account the estimated increase in population by 2.3% per annum, the total demand for milk and milk products has been projected to increase from 281,000 tons in 1970 to 440,000 tons in 1980. The sudden and steep increase of the world market prices for milk recently makes it essential, in the face of Sri Lanka's serious foreign exchange problems, for the replacement of milk imports by increasing milk production.

The main programmes to develop livestock production in Sri Lanka are centered

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round:—

(a) Increase of breeding stock by import of breeding animals
(b) Intensification of animal health activities
(c) Intensification of artificial insemination programme
(d) Development of land with improved pastures
(e) Credit arrangements and improved extension services for setting up more livestock and poultry farms
(f) Expansion of milk collection activities and establishment of new dairy processing plants.

In planning the development of animal production one has to take into account the available resources. In climate and other environmental factors, Sri Lanka is fortunate in having a variety of climates ranging from a temperate climate in the hills to a tropical one in the lowlands. Our experience over many years of breeding temperate and tropical breeds of cattle has convinced us that both these types of cattle can be reared successfully in their respective climatic zones.

The land resources for animal production are encouraging in that we have 1.8 million acres in the Dry Zone; 1.1 million acres in the coconut plantation areas and about 150,000 acres in the hill country zone. The country is fortunate in having a fair distribution of rainfall throughout the year which can maintain a good growth of indigenous and improved varieties of grasses.

The livestock population is as follows:—

Cattle	1.8 million
Buffaloes	0.8 million
Sheep	27,000
Goats	550,000
Pigs	125,000
Poultry	7 million

There is an appreciable indigenous cattle population in the country which forms the basis for the development program. These cattle are of very low productivity—the average milk production being around 4–5 pints per day with a lactation of 150 days. Their average carcase weight is around 150 lbs.

The population of temperate breeds of cattle and their crosses is about 35,000 and these cows yield an average of 10 pints of milk per day through a lactation of approximately 300 days. Their carcase weight is about 300 lbs. at maturity.

The collection processing and marketing of milk and milk products is the function of the National Milk Board while the meat industry is to be handled by the recently formed Meat Board.

Current Research

All research work pertaining to animal health and production is done by research personnel of the Veterinary Research Institute at Peradeniya.

The research work of the Animal Breeding Division could be divided into two broad aspects. The first is concerned with National Livestock improvement with special emphasis on dairy cattle and poultry. The second aspect is on research in animal genetics.

The first objective is pursued through the livestock farms of the department of agriculture. There are eight major dairy farms, one major sheep farm, one major goat farm and one major pig farm. The dairy farms have herds of Friesian, Ayrshire, Jersey, Shorthorn, Scindhis, Tharpakar and Murrah buffaloes.

Each farm has over 600 breeding cows with approximately equal number of

young female stock. These animals are all pedigreed and carry records relating to milk production and reproductive characters. The data on these animals are utilized for selection of male and female replacement stock. Progeny testing is also done but on a limited scale as the number of males that could be tested is small. Bulls selected from these farms are used in the national breeding service. In addition, superior bull calves are also sold to dairy farmers for natural breeding.

With regard to poultry, the government has a Central Poultry Research Station where specialized egg and meat strains are maintained. Selection is done within each of these lines for pure line performance and the best lines based on cross performance are utilized in hybrid production. Parental stock from this Central Station is issued to other hatcheries of the Department where commercial hybrids are produced for sale to poultry farmers.

Research

I. **Dairy Cattle:**—About 90% of the cattle in the country are the indigenous Sinhala Cattle and buffaloes. The cattle number about 1.8 million and buffaloes 0.8 million. The productivity of these animals is extremely low. Sinhala cattle produce about 1,000 lbs. of milk and reach a mature live weight of about 350 lbs. at maturity (3 years). The buffalo yields approximately the same amount of milk but reaches about 550 lbs. live weight at 3 years.

Research is therefore oriented almost entirely towards cross-breeding as this method provides a very rapid means of raising productivity.

The country has widely different climatic zones and can be broadly classified into 3 regions. The cross breeding methods and breeds applicable to each area are different.

(a) **Hill Country:**—Climatic conditions are favourable for temperate breeds of cattle, as the temperatures range from 50°F to 80°F. The cross-breeding programme in this region is geared to up-grade indigenous animals to European type by repeated back-crossing to European breeds.

(b) **Coconut plantation areas:**—There is a vast potential for dairying under Coconut. The temperature is higher than in the hill country but good fodder is available and managerial skills for dairying exist. The breeding policy in this region is to cross-breed to European cattle and stabilize at 50–75% temperate blood. Experiments on cross-breeding at a Research Farm in the area have given results shown in annex 1. In this experiment Sinhala cows were mated either to Jersey or Friesian sires. The F_1 animals were either mated' inter- Se' to produce F_2's or back-crossed to the parental sire breed to obtain the back-cross (B_1). The performance in terms of both milk yield and reproduction show a decline in the F_2 compared to the F_1. This can only be ascribed to loss of hybrid vigour (Inbreeding effects were taken into account in calculating F_2 and B_1 yields). Research is now being carried out with the use of a third sire breed on the F_1 to see whether the decline in performance due to loss of heterosis could be arrested.

(c) **Dry Zone:**—The climate in this region is harsh and forage is poor. So that even half bred European cattle are unable to thrive. The programme here is to up-grade the animals to improved zebu animals by repeated back crossing. Results of such an up-grading experiment conducted at Wirawila Livestock Farm are shown in Annex II. It would appear that unlike in the European×Zebu crosses, there is no heterosis in Zebu×Zebu crosses and most of the effects can be explained on additive genetic effects. The milk yield of the F_1 is approximately intermediate to the Scindhi X Sinhala and similarly the performance of the B_1 is intermediate to the F_1 and the Scindhi. The F_1 and B_1 Scindhi×Sinhala females are now being

mated to Jersey sires. The performance of the resulting progeny is about 50–75% higher than Jersey×Sinhala progeny. Thus, the performance of the base Stock-Sinhala or improved Sinhala is important in determining final cross-bred performance.

II. **Beef Cattle:**—The indigenous Sinhala cattle are the major source of beef in this country. Improving the genetic potential of these animals would provide a means of rapidly increasing beef production. A Cross breeding experiment of the indigenous Sinhala using sires of Santa Gertrudis breed is being conducted. The comparative performance of Santa Gertrudis×Santa×Sinhala crosses is shown in Annex III. Their weights were obtained on *Brach-aria brizantha* pasture with no supplementary concentrates. It would thus appear that there is a great potential for improving beef production by cross breeding.

III. **Sheep:**—The Sheep industry in Sri Lanka is very new. The number of indigenous sheep is only about 25,000. Efforts are therefore being made to build up a sheep industry using both indigenous×Indian breeds of sheep (imported from India) and crossing them with temperate breeds. Cross breeding experiments of indigenous sheep with Wiltshire×Dorset rams have given the following results.

Weights of lambs at 6 months

W × I (F_1W)	32.0 lbs.	W = Wiltshire Horn
W × F_1W (B_1W)	41.3 lbs.	D = Dorset
D × I (F_1D)	40.3 lbs.	I = Indigenous
D × F_1W	47.2 lbs.	
W	48.4 lbs.	
D	56.8 lbs.	

The Dorset cross has also proved to be superior in viability. The Dorset is therefore advocated in cross breeding programmes in this country.

IV. **Poultry:**—Maintenance of quality in poultry feeds is becoming difficult with shortages of various ingredients used in poultry formulations. In order to identify strains or crosses that can give relatively good performance on unbalanced feeds and the importance of genetype×environment interaction, one experiment was conducted to compare the performance of three breeds of poultry and their crosses on two planes of nutrition- (i) a balanced feed and (ii) a ration low in energy and high in fibre. The hen housed production on the two rations are given in Annex IV.

Nutrition Research

The livestock industry in Sri Lanka is facing a severe crisis due to a shortage of animal feedstuffs. In developing countries man is competing for feedstuffs like cereals which are also used for livestock feeding. There is also the problem that certain imported ingredients like fish meal are in short supply in the world market and consequently prices have increased tremendously.

Against this back ground we have felt the need to find out substitutes for traditional feedstuffs and in the case of the dairy industry, make greater use of improved pastures so as to reduce dependance on expensive concentrate feeds.

Ruminant Nutrition

The general practice among dairy farmers in the past had been to feed cows with 60 to 80 lbs. of grass and about 5 lbs. of concentrates per day to a cow yielding around 10 pints of milk. In government farms where high yielding temperate breeds

are maintained, grass is fed together with concentrates on the basis of 5 lbs. for maintenance and ½ lb. per pint of milk produced.

Research work was directed towards a reduction in concentrate feeding with better utilization of pasture. In the up country zones the predominant pasture grass is *Pennisetum clandestinum* (Kikuyu grass). This grass was thought as relatively unproductive. However, our earlier work had demonstrated that with adequate fertilizer applications the dry matter yields could be doubled. Efficient management of this pasture and grazing at 30 day intervals improved both the dry matter production and animal intake.

The next step was to determine the potential of this grass for milk production. Feeding experiments were carried out at Ambewela using Ayrshire cows, maintained under stall fed and free grazing systems. The results of these studies have shown that under stall fed conditions where grass could be provided on an ad lib. basis, a milk production of around 8 pints a day was possible from grass alone. However, under free grazing conditions milk production potential was around 5 pints. The main reason for this difference was limited grazing time allowed (7 hours a day).

One other fact that emerged from this study was that fertilized kikuyu grass grazed at 30 day intervals contained between 20–25% crude protein in the dry matter. While there was more than adequate levels of protein in the grass an imbalance was created due to the low energy content. It then became apparent that it would be necessary to change the composition of the concentrate meal to compensate for the low energy in the pasture. Experiments carried out in fact indicated that inclusion of maize to reduce the crude protein content from 16% in the concentrate feed to around 10% could be used to advantage in the hill country.

One other problem that emerged from these studies in the hill country was that of insufficient dry matter intake from pasture. This was evident only during the monsoon periods when precipitation is heavy. The moisture content of pasture increases to around 85–90%. Correcting this deficit of dry matter intake by feeding of concentrates is costly. The only possible alternative is to introduce the practice of conservation of feeds for use during these periods. Silage making is now being practised on two of the major cattle farms.

In the mid-country zone where an intensive development programme is underway, pasture grasses and fodder types of relatively high quality are available, to support a production level of 8–10 pints per cow per day.

Poultry Nutrition

This is an area which has caused considerable concern in recent times. The scarcity of feed came at a time when the country attained self-sufficiency in eggs through a booming poultry industry. Breeds of high yielding strains of both layers and broilers are being imported into the country for supply of replacement stock to poultry farmers. The demand for feed had as a result increased over the years, and at the peak period during 1972 around 7,000 tons of poultry feed produced every month. Feed manufacturers were able to obtain most of their feed ingredients locally while fish meal, maize and premixes were imported at competitive prices from abroad. Two major industrial corporations owned by the State together produce 6,500 tons which is about 80% of the total monthly output of compounded poultry feeds. The production at the present time has dropped to around 60% of the 1972 production levels due to present scarcities of feed ingredients. Coconut oil meal which forms about 25–35% of poultry feeds is not available in sufficiently large quantities, due to unusually adverse-climatic and other factors. Maize and fish meal are difficult to obtain. As a direct consequence of recent trends in feed availability, the poultry

industry which was booming in 1972 has slumped to a level that is causing concern. Feed prices were increased twice during the past 12 months and the egg prices have consequently shot up.

The research work is now mainly directed toward (1) the search for potential sources of feed material available locally (2) evaluation of feeding value of promising materials. One product which has considerable potential is rubber seed meal. This is the residue from rubberseed kernels after extraction of rubber seed oil. The oil is now used in the manufacture of paints and increasing quantities of this material are becoming available. The chemical composition is as follows:—

Protein 23–25%; Ether Extract 8–10%; Crude fibre 9–10%; Ash 6–7%.

The metabolizable energy as determined by us is 850 Kcals/lb. while the amino acid profile is similar to that of coconut oil meal. This meal is thus very similar in feeding value to coconut meal and could be substituted for coconut meal in poultry feeds up to a level of 20%.

A number of potential materials have been screened as poultry feeds. Among the most promising are manioc (cassava) meal, manioc leaf meal and whole jak fruit (*Artocarpus heterophillus*) meal. It is expected that large quantities of manioc leaf meal will become available because of the current food production campaign in the country. This material has the following chemical composition. The high protein content and also the high lysine content of the leaf protein make it a useful feed. Experiments carried out with broiler chickens have shown that this material can be fed up to 10% level without loss of weight gain. The feed conversion with 10%

	Dry matter	Crude protein	Ether extract	Crude fiber	Ash
Manioc meal	87%	2.2	1.6	1.9	1.2
Manioc leaf meal	89	27.5	12.3	13.5	6.8
Whole jak meal	89	7.5	3.9	11.1	9.8

Annex I. Performance of Jersey×Sinhala×Friesian Sinhala crosses

		Age at 1st calving (months)	305 day yield (lbs)	Lactation length (days)	Calving interval (days)
Sinhala		45.1	980	189	405
J×S	F_1	36.4	2,620	323	368
	F_2	43.2	1,366	287	408
	B_1	51.0	2,089		
Fr×S	F_1	39.9	3,360	341	412
	F_2	41.8	1,949	311	452

Annex II. Performance of Scindhi graded cattle

		Age at 1st calving (months)	305 day yield (lbs)	Lactation length (days)	Calving interval (days)
Scindhi		46	2,380	242	416
Sc×S	F_1	44	1,700	250	398
	B_1	48	2,310	250	418
	B_2	47	2,380	236	392

Annex III. Comparative weights of Santa×Santa×Sinhala crosses

	Birth weight (lbs)		6 months weight (lbs)		12 months weight (lbs)	
	Santa gertrudis	Santa × Sinhala	Santa gertrudis	Santa × Sinhala	Santa gertrudis	Santa × Sinhala
Male	69. 4	44. 9	336. 6	207. 7	513. 5	399. 3
Female	68. 2	41. 8	331. 1	177. 6	464. 7	361. 4

Annex IV. Hen Housed production of 3 breeds and their crosses

		Ration A (balanced) sire breed				Ration B (unbalanced) sire breed		
		W	R	A		W	R	A
Dam breed	W	244	236	183	W	192	205	148
	R	238	205	182	R	225	189	196
	A	239	198	229	A	199	210	164

W=White leghorn R=R. I. R. A=Austrolorp

leaf meal was comparable with the control diet with no leaf meal.

Discussion

Y. Kinoshita, Japan: I should like to ask about the size of the cattle in your country. I have heard now that the body weight of Sinhala, the native cattle of Sri Lanka, is 350 lbs at maturity (3 years). This figure is equivalent to the weight of our Holstein Friesian cow of only 6 months of age. You explained in your paper that you are going to improve your cattle, Sinhala, by import of breeding animal from New Zealand and Australia. However, I would like to know the reason why Sinhala exists in your country at present. The body size or comformation or genetic characters are concerned with the resistance to cold or heat and they vary according to the natural conditions. Is there any reason why Sinhala is preferred or do better than other breeds of cattle. For instance, because of such as high fertility. And please tell me the number of cattle kept by per ordinary farm house hold.

Answer: Sinhala had been fed in Sri Lanka for 2,000 years without selection. It is very small. Only 110 cm in body height. Sinhala has the character of resistance to heat and poor nutrition. It may be one reason why they are small that strong and bigger bull are usually used for draft work and smaller bulls remain in the herd. I think we cannot expect any improvement by breeding within Sinhala. We are going to improve them by crossing with Holstein Friesian, Jersey, or Shindy. About the number of cattle per farm, we cannot know as they are grazing all year round. We cannot catch their number.

Kassim bin Ismail, Malaysia: I am interested to hear that you are utilizing the rubber seeds for production of rubber seed meal in Sri Lanka.

Have you tried feeding this rubber seed meal to livestock. How do animals respond to this source of feed. I believe that there is present a toxic substance in the rubber seed meal. Would this toxic substance disappear in the course of processing. What is the maximum level of rubber seed meal that can be incorporated in the rations of poultry without any depressant effects on growth rates.

Answer: So far our experiments have been confined to feeding the rubber seed

meal to poultry only, and the response has been good. The optimum level of this meal in the poultry ration was found to be 20%. At the level of 30%, however, we observed a depression in production and hatchability.

There is a toxic substance in rubber seed meal and I believe it is gossypol or a substance related in it. I am told that in the process of extraction of the oil and subsequent drying the level of the toxic substance can be reduced to nontoxic level.

N. Yamada, Japan: I was informed several year ago that a new type of farming, i.e., combination of cattle production with coconut production had been developed in your country for the first time in the world. According to your paper, it seems to me that this type of farming is representing merely one of three different climatic zones. Is my understanding correct?

Is there any advantage or merit specific to that new type of farming in terms of farm management or environmental condition for animals?

Answer: The farming of dairy cattle in coconut plantations is done in Sri Lanka and also in a few other countries. We have recognized the vast potential for dairy and sheep husbandry in the 1.1 million acres in Sri Lanka which are under coconut plantation. We are now concentrating our livestock development activities in this area. Special varieties of grasses and fodder crops which do very well under the low rainfall, warm shady condition are being distributed by us free of charge for establishment under these areas.

The cattle that do well under these conditions are Jerseys crossed with zebu types. Recent incentives given by the Government to persons owning coconut plantations have made them go in for intercropping with fruits like pineapple and passion fruit and cereal crops like sorgham and maize. And so people in this area are now thinking in terms of the best return of money from their lands. So now we are facing competition.