1
INTRODUCTION

1.00 INTRODUCTION

1.01 Historical background

The common goat belongs to the genus Capra and is believed to have originated from the Middle East around Israel and Palestine (Zeuner, 1963; Devendra and Burns, 1983). Thence, it was brought by the traders through Persia, Indo/Pakistan subcontinent and then down the Isthmus of Kra to Peninsular Malaysia and South East Asia (Nozawa, 1974). The Arab and Indian traders who came by sea also brought the goats in the ships as source of meat, milk and hide (Yamane, 1943; Chakravarti, 1961).

Recent population biochemical genetic studies (Selvaraj, 1997) have confirmed that the native dwarf goats of Thailand, Philippines, Indonesia, Malaysia and Sri Lanka are genetically similar and have similar chromosomal characteristics. Since the genetic diversity between various populations in these countries are minimal, these populations may have the same origin.

Goats of Taiwan (Devendra and Nozawa, 1975) also resemble the Katjang type of Indonesia and Malaysia and the dwarf goats of South China (Epstein, 1969). The 'Indo-Chenese' as listed by Mason (1988) is the common breed found in Myanmar, Laos, Kampuchea and Vietnam. It is also the "Katjang" type and possibly has the same origin. The one in Thailand (Falvey, 1978) and the Philippines native breed (Arganosa et al., 1977) of course are very similar to the "Katjang" breed as confirmed by Selvaraj (1997).

Earlier, Quartermain (1979) had also suggested a common origin for the Asian goats.

1.02 **Status of goats in the world**

The goats and sheep comprise an important part of the farming system in many parts of the world, providing valuable commodities such as meat, milk, skin and hide, and fibre (Mukherjee et al., 1991; Acharya and Singh, 1992; Devendra, 1992; Shelton, 1992). The goat is usually associated with the poor rural farmers in the tropics and subtropics (Mukherjee, 1980; Peters, 1980; Shelton, 1983; Deichert, 1991; Acharya, 1992;) and serves as a "savings bank" for the small holders who lack access to credit facilities (Sakul et al., 1994). Its ability to convert forages, crop and household residues into meat, fibre, skin and milk is commendable (Peters et al., 1986/87; Devendra, 1989; Soejana, 1994).

Many reports highlight the goat as a highly productive farm animal (Devendra, 1992; Shelton, 1992; Heinlein, 1992); but at the same time the goat has been blamed for soil erosion, destruction of young trees by eating buds and stunting regrowth, management difficulties in restraining, the offensive odour of the bucks and production of strong flavoured meat (Colomer-Rocher, 1987; Acharya and Singh, 1992).

The goat advocates, on the other hand, have commended the goats by stating that the goats are intelligent animals compared to the sheep and cattle; utilize pastures

which neither cattle nor sheep will consume; control weeds; the kid meat acquires exceptional qualities and attain high price; the goat skin produces firmer leather than sheep skin; the fleece and mohair possess lustre, gloss, resilience, and warmth; and the goat milk has better nourishing qualities compared to that of cow or sheep (Peters et al., 1986/87).

The world population of goats and sheep have increased by about 5.19% from 1.637 billion in 1986 to 1.722 billion in 1996 (Table 1.01). About 48.99% of the world's goat and sheep populations are found in the Asian countries and only a small fraction of it are found in Malaysia (FAO, 1997). Unfortunately, the trend of the goat population in Malaysia has been on the decline over the years as compared to sheep (Figure 1.01). In the Asian region, however, the goat and sheep population continued to increase annually in spite of neglect and over the previous two years (1994-1996) there has been an increase of 6.35% in sheep and 7.47% in goat population.

Soedjana (1994) had earlier indicated that the developing countries accounted for 68% of the world total of small ruminants where as the developed countries contributed only 32%. Of total small ruminant population of Asia, goats comprise 439.08 mill. and 404.42 mill. are sheep (FAO, 1997).

1.03 **The indigenous goat of Malaysia**

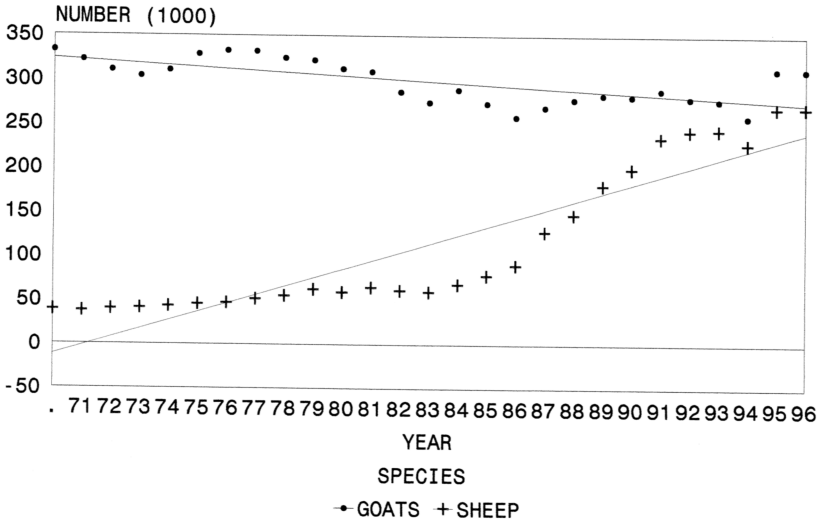
The local goat resembles the Black Bengal of India and thus it is hypothesized that the Indian traders from Bengal (India and Bangladesh) brought in the Black

Table 1.01:World Goat and Sheep Population for year 1986-1996

Year	World (1000 heads)			Asia (1000 heads)		
	Goat	Sheep	% Increment of goat pop.	Goat	Sheep	% Increment of goat pop
1986	494723	1142429	.	274415	323263	.
1987	504457	1150952	1.97	282284	331489	2.87
1988	520376	1172828	3.16	295847	331566	4.80
1989	569369	1194037	9.41	328742	355482	11.12
1990	587065	1215633	3.11	341334	360443	3.83
1991	594286	1202920	1.23	343725	357561	0.70
1992	581317	1133372	-2.23	351369	341381	2.22
1993	592874	1096049	1.99	359866	359866	2.42
1994	609488	1086661	2.80	373005	340102	3.65
1996	674139	1047720	10.61	439080	404417	17.71

Source: FAO Production Yearbooks 1988,1994,1997.

FIG. 1.01: ESTIMATES OF GOAT AND SHEEP POPULATION OF MALAYSIA



Bengal through the port of Penang (northern port of Malaya) and as such the local goat possibly could have inherited the black coat colour of the Black Bengal due to closed breeding (Chakravarti, 1961; Quartermain, 1979).

The local indigenous breed came to be called "Katjang" goat or "bean" goat or "pea" goat equated to a broad bean or pea, as it was a compact and meaty animal. As a result of the early importations and restricted number of breeds and types and due to resultant inbreeding, the goats in Malaysia and to a certain extent in South East Asia over the years became more uniform and black in colour. However, the size and productivity of the animals was reduced (Paramsothy, 1957; Devendra, 1962, 1978; Rajendram and Pillay, 1976; Mukherjee, 1980; Deichert, 1980; Bhanumati, 1982; Abdul Wahid, 1987; Panandam, 1992).

1.04 **Breed improvement**

To improve the performance of the existing "Katjang" breed, there are a few options that could be adopted. They are:

a) The first option is to do pure breeding within the available breed with intensive selection. This involves commencing the programme with the best animals available for the trait or traits to be improved and to select the best for replacement in the breeding stock. By this method the total genetic gain per annum or generation may not be very much but it is cumulative and permanent. The improvement would be slow but effective.

b) The second option is to import the desired number of animals of the specific breed(s) to meet the needs of the country followed by purebreeding of the imported breeds for meat and milk production. This method is very expensive and beyond the reach of most developing countries.

c) The third option is to import a few quality exotic animals of specific breeds and cross breed them with the local indigenous so as to utilize hybrid vigour and achieve the objectives in the shortest possible time. This method is often used to improve reproduction and meat production capabilities (Foote and Nelson, 1983; Bhat, 1987; Horst et al., 1990). By this method crossbred dams are produced by combining two or more breeds to provide for increased prolificacy as well as relatively higher birth weight, rate of gain and other characteristics such as vigour, milk production and mothering ability.

1.05 **Crossbreeding**

Malaysia adopted the third option and the agencies involved with development and research imported a number of temperate breeds of goat for crossbreeding purposes. It was only in the middle of this century (1950) that efforts were made to improve the size and productivity of the local indigenous goat by crossbreeding with imported exotic goats (Keeping, 1951; Paramsothy, 1957; Mahmud and Devendra, 1970; Mohd. Khusahry et al., 1985; Stemmer, 1993).

Jamnapari breed, sometimes referred as the Etawah breed of goat, was imported from Indonesia, followed by importation of Anglo Nubian, British Alpine, Saanen and Toggenburg from the West. Semen from other breeds that were initially imported for research purposes but since then have contributed significantly to goat development programmes in Malaysia are the Boer and Improved German Fawn (Mukherjee, 1984; Deichert, 1986; Deichert, 1991; Panandam, 1992; Stemmer, 1993). In the above cases, semen from Boer and Improved German Fawn were brought from Germany to inseminate Local Katjang females in two separate breeding programmes.

The development stations under the jurisdiction of the Ministry of Agriculture including Institut Haiwan, Kluang, and MARDI station, Serdang, initiated development programmes to multiply Jamnapari and Anglo Nubian breeds for distribution to the villagers to upgrade their existing local animals. As a result another group of animals were produced which were either of Jamnapari x Katjang (JK) or Anglo Nubian x Katjang (AK) cross, besides the indigenous "Katjang" (KK) pure breed.

The existing local breed groups (AK and JK) in Kluang were then crossed with Saanen an improver breed to produce 3-way crosses with the hope of introducing the desireable genes for size, milking ability and reproductive efficiency. The AK, SK and KK in Serdang were then crossed with Katjang so as to incorporate the meaty characteristics of the Katjang breed.

1.06 **Studies of body growth in goats**

Studies on postnatal growth have often depended on either quantitative comparison of body weight at a specific time or qualitative comparison of the plotted growth curve (Laird and Howard, 1967). A typical growth curve is sigmoid in shape. The point of inflection at which the concavity of the curve changes to convexity is the period when growth is most rapid. The time at which this point is reached or attained varies in different species of animals and in different breeds.

The fundamental period of growth in a goat is of importance both from research as well as commercial points of view. The relative rate of growth of different parts of its body entails the ultimate shape the animal will take within a breed. These rates of increase of parts at definite periods of the growing animal also helped the breeders to know the commercial utility and the probable potential of altering its size by efficient selection, breeding and modifications of the nutritional environment.

The growth performance of the progeny is measured by the changes in body weight at birth, weaning and post-weaning or average daily gain between any two specific stages in the growth curves. In most of the smallholder farms, birth weight is never recorded. However, it is not considered to be of much importance other than to provide a more accurate estimate of average daily gain from birth to weaning. It is believed that there is a strong correlation between birth

weight and live weight increase (Kean and Henning, 1949; Datta et al., 1963) and, therefore, in any improvement project at the smallholder level or at the government farm, heavy birth weight and fast growth must be the aim.

Before any breeding plan can be formulated to improve economic characters of goat genetically, the traits involved for their production should be defined clearly and measured objectively and accurately. There are two main approaches for measuring production in goats and each has its own merits and demerits. The first approach is to measure each of the elementary traits that contribute towards the processes of growth and reproduction. This is often referred to as evaluating the vital statistics of the goat population. The second approach is to formulate an index that gives a single measure of overall production (Singh et al., 1970; Acharya, 1992; Arora, 1992). However, before formulating the index, knowledge of genetic parameters is of utmost importance.

1.07 **Objectives of study**

For the purpose of this study the earlier methodology is adopted where the growth is measured from the birth weight, weaning weight, adult weight, body measurements and average daily gain (ADG) as well as the pattern of growth curves. Consequently, the objectives of this study were:

1) Analyze the existing data available at Institut Haiwan, Kluang, and MARDI station, Serdang, for growth so as to get an overview of the existing performance of

the purebred (KK, JJ, AA) and crossbred (AK, JK, SK) groups of goat as well as grades of Jamnapari x Katjang (JK_R, JK_T, JK_U, JK_V, JK_W);

2) Crossbreed the existing breed groups (AK and JK) with male Saanen at Kluang and AK, SK and KK breed groups at Serdang with female Katjang so as to compare the performance of 3-way crosses (S(AK) and S(JK)) with contemporary AK and JK at Kluang and (AK)K and (SK)K with the component breed groups KK, AK and SK at Serdang. The resultant progeny (AK, JK, S(AK), S(JK)) at Kluang and (KK, AK, SK, (AK)K, (SK)K) at Serdang are evaluated for growth from birth to year-old. An attempt has been made to compare the breeding groups within each location as the 2-breed and 3-breed crosses produced in the two locations were different. The data collected from Serdang was also compared with the imported breeds for clearer illustration of their potential.

3) Determine the milking ability of the dam breeds (AK and JK) in Kluang and illustrate the advantage of the progeny of three way crosses (S(AK) and S(JK)) over two way crosses (AK and JK);

4) Identify the various genetic and non-genetic factors causing variation in above traits.

1.08 **Presentation of thesis**

This thesis, therefore, presents the information on the performance of some of the exotic breeds of goat in relation to the Katjang and their crossbreds at both the

experimental stations. Information on other groups for example, German Fawn x Katjang crosses is not incorporated as there are already four Ph.D theses involving the data of this project - two at University of Malaya and two at the Technical/Humboldt University of Berlin.

The thesis is divided into a number of chapters and begins with an Introduction and followed by a detailed Literature Review of body growth and milk productivity of goats. This is followed with a list of Materials required and Methodology adopted in the study. The subsequent chapter presents the significant Results supported by relevant illustrations and justified by the Discussion which culminates with the Conclusions and Recommendations based on the research findings. The use of Saanen as an improver breed and the problems encountered in using data from the two stations are highlighted.