5
DISCUSSION

5.0 DISCUSSION

5.1 Growth performance of goats

5.1.1 Birth weight and subsequent body weight

Birth weight is an important economic trait which can influence post-natal growth and survivability. It is also an indication of genotype and performance of the parents. Body weight is an indicator of production and profitability and will indicate the economic returns from the enterprise. Body weight in general reflects the genetic potential of a breeding group. It helps in making decision on management, housing, feeding, breeding and health.

From the data available at the two stations Institut Haiwan, Kluang, and MARDI Research Station, Serdang, and also based on the trials conducted at the two stations, it was evidently illustrated that the introduction of exotic breeds of Anglo Nubian, Jamnapari and Saanen genome into the local Katjang purebred and crossbreds produced a significant positive response on body weight and body growth. This is in agreement with some of the reports presented by a number of research and development scientists in Asia as well as other parts of the world (Devendra, 1962; Epstein and Herz, 1964; Mishra et al., 1978; Mukundan and Bhat, 1978; Nath and Chawla, 1978; Mohd Khusahry et al., 1981; Mukundan, 1981; Mukherjee et al., 1983; others). Other breeds that have been shown in Malaysia to exert an influence on the growth rate are the Improved German Fawn and Boer (Horst et al., 1984; Fetz et al., 1985; Noraidah Ismail, 1986; Deichert, 1990;

Panandam, 1992 and Stemmer, 1993).

Although the Jamnapari is considered as an exotic breed but its effect in the first cross (50/50 genome) was contradictory to effect of German genome where Panandam found the German Fawn at 50% level increased the body weight significantly ($P<0.05$). The crossbreeding parameters as reported by Panandam (1992) showed that the improvement was not only due to the positive heterotic effects but also due to the significant ($P<0.01$) individual additive genetic effect of the German fawn genes.

5.1.1.1 Effect of year of birth

The analysis of variance performed on birth, weaning and year-old body weights accumulated over the years (AA, JJ, JK and AK) demonstrated a highly significant ($P<0.001$) effect of year of birth, season, type of kidding, sex of kid, breed of sire, breed of dam and type of progeny on birth weight. The weaning weight was significantly affected by year of birth and season but not any of the other effects. At year old, the year of birth, season, type of kidding, sex of kid, breed of sire and breed of dam had a very significant ($P<0.01$) influence on body weight. Earlier, Singh (1973), Sharma et al., (1981) and Siddique (1981) had also recorded similar findings.

5.1.1.2 Influence of season

Season has been illustrated to influence significantly the birth weight of kids (Khan et al., 1979; Rana, 1980; Sinha and Sahni, 1983). Kids born in summer were

found to be heavier than those born in winter (Mittal, 1979). However, there are others (Moulick and Syrstal, 1970) who did not observe any effect due to season.

Season influenced the birth weight and 3-month body weight very significantly ($P<0.01$) and less significantly ($P<0.05$) on 9-month and 12-month body weights. Earlier Mittal (1979), Rana (1980) and Sinha and Sahni (1982) working with Jamnapari goats have also found significant effect on birth weight due to season of kidding. They found the kids born in summer were heavier than those born in winter.

This study demonstrated that monsoons in Malaysia also have a significant effect ($P<0.01$) on birth weight and ($P<0.05$) on year-old weight. Those born during the dry period (Between the monsoons) were found to be heavier as compared to those born during the rainy days (monsoons) similar to the report by Ngere et al., (1984) in West Africa. Those born during the monsoons were also highly susceptible to post-natal mortality. It was also observed that the effect of season was not significant on the 6-month weight which may be due to the low growth performance at this stage (Singh and Sengar, 1970).

5.1.1.3 Sex effect

Many research workers have found that sex effects the birth weight of the kid, however, the effect varies between the breeds, prolificacy and locations (Mukundan et al., 1981; Mukherjee at al., 1983; Sinha and Sahni, 1983; Goul and Biswas, 1987; Wilson, 1987).

In the present study, sex had a significant ($P<0.01$) effect on the mean birth weight of the kids. The least squares means showed the males to weigh upto 12.5% heavier than the females. The difference between males and females was not very conspicuous at first, second and third months of age as depicted by the AA, JJ, AK and JK data at Kluang. After weaning the growth was greater in the males. The heavier weight of the male could be due to sex-linked inheritance as well as anabolic effect of the male sex hormone secreted as the animal matures (Hafez, 1974). This phenomenon was also observed by Darokhan and Tomar (1983), Kohl and Biswas (1987), Wilson (1987), Mittal (1988) and Panandam (1992). The difference between the males and females was greatest at 12 months of age. This value, however, was quite low compared to the reports of Paramsothy (1957), Devendra (1962), Mahmud and Devendra (1970), Mukherjee et al., (1982) and Panandam (1992). The influence of sex on birth weight was present in all progeny groups in the study at Kluang.

Similar advantage of males over the females had been observed in Malaysian goats by most of the research workers including Deichert (1986), Noraidah Ismail (1986), Panandam (1992), as well as in Indian goats by Khan et al., 1979), Mittal (1979), and Rana (1980), and in Latin American goats by Castillo (1972). The difference between the male and female birth weight can be as much as 1.0-1.3 kg and the females can weigh as much as 64.1% (Devendra, 1962) to 6.0%

(Epstein and Herz, 1964) less than the males. However, Mittal and Pandey (1978) and Khan et al., (1978) demonstrated that the female kids of Barbari were heavier than the males at birth though the difference was statistically not significant (male = 1.95±0.295 and female = 1.98±0.184 kg).

Though sex had significant effect on body weight at all ages (Belinchos and Marques, 1971; Hafez, 1974; Mishra et al., 1978; Rana, 1980; Mukundan et al., 1983a; Malik et al., 1986; Noraida Ismail, 1986; Wilson, 1987), Mittal and Pandey (1978), however, stated that the difference in body weight due to sex at 1, 2 and 3 months of age, was not significant as observed in the present study. It was possibly due to the compensatory growth of the kids when given equal mothering attention and equal opportunity at feeding or due to the sub-standard feeding as they found the body weight to increase with higher level of nutrition Mukundan et al., (1983).

Most of the works show that the males are usually heavier and this advantage is maintained through out growth and adulthood. The variation between sexes varies with age (Malik et al., 1986; Mittal, 1986; Wilson, 1987). The difference in body weight due to sex is more profound in the adults than in the kids. Some workers have obtained fluctuating results (Datta et al., 1963; Guha et al., 1968; Maglad and Kudouda, 1987). The difference between the sexes at adulthood is probably related to the early age at parturition in the females and the subsequent reduction in weight caused by energy requirement for lactation (Wilson and

Katsigianis, 1980).

The effect of sex on birth weight also is demonstrated in multiple births. Males in twins were significantly heavier than their female partners (Seth et al., 1968). In Saanen breed, triplets and quadruplet females weighed 8.7 and 9.2% less than male kids. On the other hand, some scientists have found no difference in birth weight of male and female kids. In this country, Paramsothy (1957) and Devendra, (1966) found the male to be only 0.1 kg heavier than females. Such non-significant difference have been observed in Jamnapari (Datta et al., 1963), Barbari (Mittal and Pandey, 1978), Black Bengal (Ali, 1980) and Katjang (Mahmud and Devendra, 1970).

5.1.1.4 Influence of litter size

Litter size has a pronounced effect on the birth weight of a kid (Dickinson et al., 1962; Singh, 1973; Metz et al., 1985; Noraida Ismail, 1986; Wilson, 1987). The larger the litter size, the smaller the kid size/weight. In other words, the single born kids are heavier than twins which are heavier than triplets and quadruplets. The weight of the twins may be as low as 25-75% the weight of singles (Mishra et al., 1978; Deichert, 1981; Mukundan et al., 1981). Negative relationship exists between litter size and birth weight. Litter type also had significant influence on subsequent body weights. In the study at Kluang, the birth weight decreased with increasing litter size and the ratio of single to multiple births was 51:49. This difference was not

significant in agreement with Koul and Biswas (1987).

Averaging effect of litter size on the body weight of goats has been observed. The Assam goats showed significant difference due to litter size (Sharma et al., 1981). Wilson (1987) found the effect of litter size to be significant ($P<0.05$) up to 240 days of age. Singles weighed as much as 0.7 kg more than the contemporaries of multiple births. No significant variation in body weight at different stages of growth were found in Black Bengal breed (Guha et al., 1968) and Barbari (Sharma et al., 1981).

The heavier body weights of singles compared to twins and triplets may be due to the former retaining their initial advantage at birth. The dams may not be able to provide pre and post natal care to the multiple kids as compared to singles. There is greater competition between the higher litter for the milk and feed. Quite often during the pre-weaning period the dam's capacity will influence the body weight. After weaning the quality and quantity of the dry feed provided and the genetic potential of the animal itself will have the greater effect (Alkass et al., 1986; Maglad and Mudouda, 1987).

.1.1.5 Effect of parity

Parity is often confused with age of dam. Parity in ctual sense is the first kidding as compared to subsequent iddings. It has been demonstrated that birth weight of kids rom first kidding is usually a little lower (Epstein and erz, 1964). The mean birth weight of subsequent kiddings

were found to be 5.3, 4.1 and 4.3% higher than first kidding single, twin and triplet males, whereas the females were 4.1 and 3.8% more than female of single and twins. The single born kids from primiparous were lighter than the multiple kids from multiparous. The higher birth weight of offspring from older dams maybe due to the increase in the stage of maturity of these dams (Alkass et al., 1986) and more favourable environment for foetal development. This phenomenon was not observed in the local goats by Anuar and Devendra, (1970) who found the kids from first kidding to be heavier than second and subsequent kiddings.

Limited work has been done on the effect of parity or age of the dam on body weight of goats (Moulick and Syrstad, 1970; Mittal, 1979; Raats et al., 1984) as compared to sheep (Shelton and Campbell, 1962; Osman and Bradford, 1965; Ch'ang and Rae, 1970; Martin et al., 1980). The effect of dam is evident when the kids are young. Post-weaning, the effect is reduced (Ch'ang and Rae, 1970).

5.1.1.6 Dam weight

The weight of dam also affects the birth weight of kids. Heavier dams produce heavier kids (Devendra and Burns, 1970; Prasad et al., 1972; Khan, 1980; Mukundan et al., 1981; Sinha and Sahni, 1983) due to the better environment of the uterus in bigger dams. Weight of dam at post-kidding has been found to be significantly ($P<0.01$) and positively correlated with kid birth weight in Jamnapari, Beetal, Barbari and Black Bengal goats (Sinha and Sahni, 1983).

5.1.2 Growth rate/Feed efficiency

The average weight gain of animal per unit time is the rate of growth which represents the genetic potential of the animal for growth and mothering ability. Residual variation is largely attributable to environmental variation. Pre-weaning growth is function of maternal performance exerted through suckling (Mavrogenis et al., 1980). The post-weaning growth is important and determines the meat producing ability up to market age.

Sex effect is evident on growth rate and dressing percentage of kids. The gain per day of Beetal females and Black Bengal females was 32-117% of that of males. Post-weaning growth rate was 81.08 and 51.70 gm/day in females and males respectively.

There was a better combining ability of Saanen with AK as compared to JK breed group, and it was evident that with improved nutrition the growth rate and the carcass yield could be improved resulting in increase of income.

5.2 **Milk production and quality**

The study at Serdang showed that the AK breed group produced 0.40 kg of milk per day with range of 0.05 to 0.62 kg/day. The JK breed group produced on the average 0.335 kg/day with a range of 0.07-0.62 kg/day. The advantage of AK over JK was 19.40%. An earlier report (Abdul Rahim and Abdul Wahid, 1980) have also indicated that the Katjang goats produced 0.4 kg of milk per day and 120 kg/year compared to undefined crossbreds which produced 0.75 kg/day and 225

kg/year (Devendra, 1975).

It was noted that these figures were comparable to the yields of the local crossbreds of Philippines (Castillo, 1983) and that of the Khorasani goat of Pakistan (Khan et al., 1992). These are the small-sized breed groups and thereby have similar productivity of milk. The Pakistani 'Teddy' breed produced 0.391 kg/day (Iftikhar-uud-din, 1979). However, the AK and JK breed groups produced more milk compared to the Black Bengal of Bangladesh (Alam, 1992) which produced only 0.18 kg/day. Besides being small in size the AK and JK breed groups were the unselected samples and therefore a direct comparison of milk production between the AK and JK breed groups as compared to the temperate breeds is not justified.

The advantage of F1, F2 and BC2 of German Fawn x Katjang at University Malaya have also out yielded these two breed groups by recording lactation yield of 289, 216 and 251 kg in an annual lactation (Stemmer, 1993). This was evidently due to the fact that the goats in Universiti Malaya were of a selected group whereas those in Serdang and Kluang, for that matter, were never milked nor were they selected for milk production. As a result the lactation yield varied between the different breed groups and direct comparison between the yields at Universiti Malaya with Serdang and Kluang is improper. However, the results of this study have demonstrated significant improvement of milk yield (93-110%) in the progeny mated to Saanen. Mukundan et al, (1983)

obtained an increase of 139% in yield by crossbreeding with Saanen and in Ya'an city of China, the milk yield have increased from 200-400 kg/goat by crossing with Saanen (Leonard, 1992). In western China where Xinang Saanen is used to upgrade the local goats, milk production has been reported to be 800 kg/lactation (Luo, 1992).

Thus, it is confirmed that Saanen is one of the right option for increased milk production in Malaysia. In fact many private breeders have recently bought Saanen for specialized goat milk enterprises. Other breed crosses such as with Improved German Fawn, British Alpine, Toggenburg and Anglo Nubian (Ruvuna, 1980) also have a role to play and are complimentary. And, in the Malaysian context, selection for first lactation milk yield and age at first kidding need special attention.

Keeping in view the desire to improve the overall performance of the crossbreds it is justified to recommend the use of Saanen for crossbreeding with the local Katjang purebred and crossbreds either as a direct cross or as a backcross. The incorporation of Saanen would improve the body weight, growth rate, milk production, mothering ability, carcass characteristics, male and female fertility, survivability and total output from the farm.