

# INTENSIVE INTEGRATION OF GOAT IN OIL PALM AREA

MD ZAINAL RASYIDI, M R; KAMIL AZMI TOHIRAN; RAJA ZULKIFLI, R O and WAHID, O



In normal practice, goats are integrated in oil palm area using semi intensive production system. The goats are released in oil palm area during day time for browsing and kept in goat's house at night. This system requires large area for browsing and the integration can only be started when the palms had reached four years old. The stocking ratio for this system is five breeder goats in a hectare with rearing model of 50 breeder goats for 10 ha of oil palm area (Kamil *et al.*, 2007). Therefore, oil palm growers with small land holding are difficult to practice this semi intensive goat production system. Alternatively, the goat can also be reared following intensive production system whereby the goats are kept in the goat's house all the time. But, the feed need to be supplied in the goat house on daily basis. Goat feed such as green roughage can be collected in oil palm area and supply to goat by cut and carry system. With this system, the number of integrated goats can be increased and the integration can be started even though oil palm at immature stage. The objective of this technology is to discuss several aspects of good animal husbandry practice required for integrating goats in oil palm area using the intensive production system.

## GOOD ANIMAL HUSBANDRY PRACTICES

### Breeding Stock

This intensive integration model is suggested for starting with 50 does and four bucks. Selection of

breed that resistant to worm infestation, adapt to local environment and high prolificacy are main criteria in selection of goat breed for this model. The indigenous goat known as Katjang was tested for this rearing system because it fulfilled the above determined criteria. Coat colours for Katjang are prominent dark chocolate and black. Mature goats aged between 12 to 24 months old with body weight range of 20 to 30 kg were selected for breeder does. For breeder bucks, age should be 18-24 months old with live body weight of more than 25 kg. Do not select any goat that have abnormal physical apparent such as lump under the skin to avoid cases of *Caseous Lymphadenitis Adenomatous (CLA)*, scabies and other diseases.

### Farm Facilities

An intensive goat integration system requires a proper goat house. A raised wooden floor goat house should be constructed in a safe location. The height of the slated floor and roof of the goat house should be 1.5 m and 3.5 m from the ground level, respectively. The goat house should be divided into several pens for grouping the goats according to their physiological condition needs (Figure 1). The goats are grouped based on bucks, breeding does, late pregnant does, kidding does, weanling male kids, weanling female kids, yearling male, yearling female and sick or weak animals. The goat house compound should be fenced to deter predator animal such as the wild dogs. Other facilities such as water tank, slurry pit, and compost house also need to be constructed.

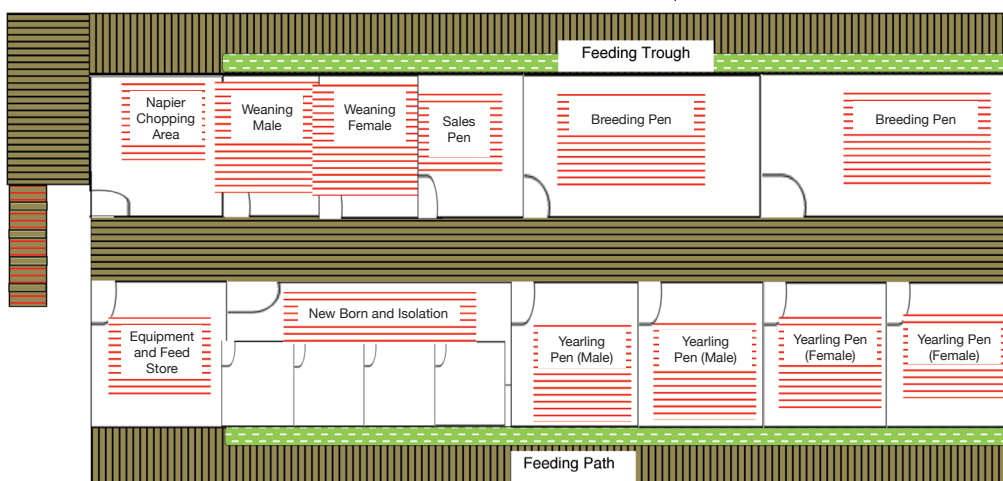


Figure 1. Floor view plan of the goat house.



## Feeding Management

Katjang goat is a breed of low maintenance goat that requires small amount of feed. Available green roughages in oil palm plantation such as pruned oil palm frond (OPF) (Figure 2) and natural undergrowth are suitable feed for feeding the goats. OPF should be collected a day earlier for feeding the goats. Only half of the OPF in the upper part is taken for use as goat feed. This part has many leaves and less petiole. The leaves are palatable than petiole. This OPF needs to be chopped prior to feeding (Figure 3). Chopping OPF increase intake by the goat compares to feeding the whole frond. Green chopped OPF is offered to the goat (Figure 4) twice daily on *ad libitum* quantity and remain of non-palatable petiole (Figure 5) are removed every morning before supplement feed given. Soyabean hull pellet is given at 200 g per day for adult goat and 100 g per day for growing kids. Clean water and mineral block were made available at all the time in the goat house.



Figure 2. Pruned OPF as goat's feed.



Figure 3. Chopping OPF for feeding goats.



Figure 4. Goats eating chopped OPF.



Figure 5. Balance of non-palatable OPF petiole.

## Breeding Management

This production model requires a total of 50 does and four bucks as breeder goats for starting the project. The breeder does are divided into two main groups. Each does group should be put in separate breeding pen with one buck. Suggested breeding technique for this intensive integration system is by natural mating where a high libido (fertile) buck will be allowed to mate with open does. The bucks are allowed to mate with does all year round with one buck for 25 head of does. However, the bucks should be rested after two weeks of service for remaining active for next service. Other bucks will be assigned for servicing during this period. Prior to joining, the does need to be flushed with high energy feeds for two to three weeks. This practice will increase ovulation rate especially in thin does with body score less than 3. Increased ovulation will increase twinning in does respond to flushing. Pregnancy diagnosis using portable ultrasound can be carried out three months after the does were mated. Does still did not give birth after two year of age should be culled. Replacement does need to be selected from doeling group that reached one year of age or has reached at least 65% of mature body weight.

## Parturition

Prior to parturition, trimester pregnant does must be separated from other groups. More attention should be given to this group especially on feeding aspect. Late pregnancy does need more nutritious feed because high demand from foetus especially for does carrying multiple foetuses. Does received in-sufficient nutritional supply will have pregnancy toxemia problem. At parturition, handler needs to be there for rendering assistance to does facing difficulty in kidding. Newly delivered kids, should be treated with iodine on its navel and make sure kids suckling on their dams for colostrums milk. After two week of birth, kids need to be de-worm by used Ivermectin 1% or Albendazole. All born kids should stay with their dams until weaning at four months later.

## Weaned Kids Management

Kids must be separated from their dams at four months of age. Weaned kids are placed in the growing pens according to their sex. Stress from weaning process should be minimised. It is better to place the weaned kids in their pen side by side with dam's pen. This approach will reduce weaning stress on goat kids. As a preventive treatment, weaned kids are de-worm and de-ticking using Ivermectin 1% by subcutaneous injection and Neguvon by spray respectively. Annual vaccination also a must for weaning kid and it's done before rainy season. Weaned kids must be supplied with good forage and supplement feed. This will put weight on goat kids quickly.

## Animal Herd Health Programme

The goat's behaviour and physical appearance must be monitored on daily basis by the handler. The handler needs to check for sick or injured goats daily. A sick or injured animal must be treated immediately and isolate from other groups. Goats that cannot be treated or did not response to treatment should be culled. It is also very important to have a herd health programme for this intensive system to prevent the goats from succumbing to any diseases. In this health programme, deworming and de-ticking are done regularly by interval of four months apart or earlier if the goats showed any symptom of infestation. This can be done by using Ivermectin at 1% active ingredient by subcutaneous injection for control of worms and ticks (broad-spectrum anti-parasitic). For coccidiosis control on goat kids, the recommended medicine is sulfaquinolone liquid offer in feed. For vaccination programme, the Glanvac 6 is used for control CLA, enterotoxaemia, tetanus, black disease, malignant oedema (black leg) and swelled head. Blood screenings for diseases such as Foot and Mouth Disease (FMD), Brucellosis and CLA are also need to be carried out annually.

## Manure Management

In this intensive production system, a good manure management is highly required. This is important for preventing goat from the side effect of manure. At the same time, manure can be collected for sale or used as bio-fertiliser for oil palm planting. It is recommended that manure should be collected every day. Collected manure needs to be housed in the compost house according to first in first out system. Later after three months, the manure should be packed in used fertiliser sacks for sale or use for fertilising the oil palm.

## TECHNICAL PERFORMANCE

### Feeding Performance

Feed is considered the most important inputs in goat rearing system especially for intensive production system. Goat's performance for breeding and growing ability are largely depend on good feed supply in term of quantity as well as quality. Feed supply for this intensive production system was pruned OPF available abundantly in oil palm plantation. Therefore, not necessary to plant Napier grass or other grasses as goat feed. However, only the most nutritious part from the whole OPF should be given to the goats which is the green leaves (*Table 1*). Green chopped oil palm leaves are very palatable to the Katjang goats reared under this system. Goats are selective browser and will only select chopped leaves and refused the petiole and stalk of oil palm frond.

TABLE 1. NUTRITIONAL CONTENT OF PRUNED OIL PALM FROND LEAVES

Feed	Mean	Standard deviation	Minimum	Maximum	Count
Crude protein, %	12.3	1.1	9.6	14.1	23
Crude fat, %	3.1	0.7	0.7	4.0	23
Crude fibre, %	22.4	1.5	19.8	26.3	23
Total digestible nutrient, %	65.0	2.5	61.0	70.3	23
Metabolism energy, MJ kg <sup>-1</sup>	9.8	0.4	9.2	10.7	23

The oil palm leaves had slightly higher nutritional content compares to Napier grass and natural under growths available in oil palm plantation (*Table 2*). Low crude fibre content and high digestible of oil palm leaves make it ideal as green feed for goat. A feeding trial was carried out on Katjang male goat kids using different green feedstuffs in this table. This trial was run for 100 days using *ad libitum* amount of green feedstuffs offered plus 200 g per head of soya hull pellet for each group.

TABLE 2. NUTRITIONAL CONTENT OF DIFFERENT SOURCES OF GOAT FEED

Feed	OPF (leaves)	Napier grass	Under growths	Soya hull pellet
Crude protein, %	12.3	11.1	11.5	19.4
Crude fat, %	3.1	0.9	1.0	3.6
Crude fibre, %	22.4	33.7	31.6	9.1
Total digestible nutrient, %	65.0	60.5	60.3	77.5
Metabolism energy, MJ kg <sup>-1</sup>	9.8	9.1	9.0	11.9

Based on this feeding trial, average daily intake of green chopped oil palm leaves was recorded at 3.0 kg per head for male goats with average body weight of 23.7 kg. This green feed intake represents about 13% of the goat's live body weight. Result of this trial indicated that there was no significant different of average daily weight gain of goats fed with oil palm leaves compared to goats fed with Napier grass or natural under growths.

## Kidding Performance

Kidding performance was good for Katjang goat reared under intensive production system. Based on three years data, average kidding rate was 121% (Table 3). Twinning rate in Katjang breed quite low compare to other breeds. The average birth weight was 1.36 kg for male kids and 1.29 kg for female kids. The kids were successfully weaned from their dams at four months of age.

**TABLE 3. KIDDING PERCENTAGE OF KAJANG GOAT IN INTENSIVE PRODUCTION SYSTEM**

Year	Year 1 (2013)	Year 2 (2014)	Year 3 (2015)	Average
Kidding rate, %	102	149	113	121
Twinning rate, %	5	21	7	11

## Growth Performance

Weaned kids at four months old have average body weight of 8.32 kg for male and 7.12 kg for female. At 12 months old, average body weight was 19.64 kg for yearling male kids and 13.81 kg for yearling female kids. Male goat kids grew faster compared to female kids (Figure 6). Minimum marketable weight for Katjang goat is 20 kg which is at the age one year. The carcass percentage was average 40% for male (n=10) and 38% for female (n=8).

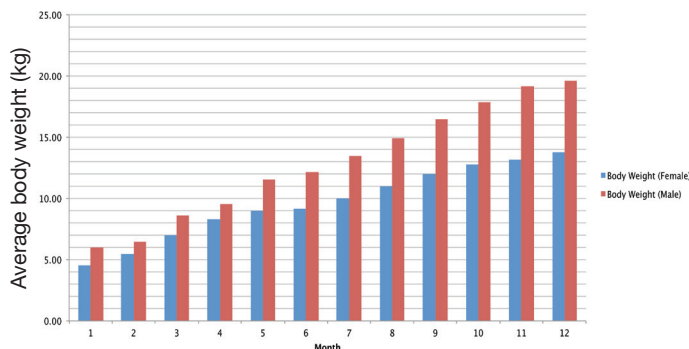


Figure 6. Growth trend of Katjang goat kids in intensive production system.

## Mortality Rate

Mortality of goats in this production system is acceptable. On average, adult goat's mortality rate was 5% for three years period. But, goat kid's mortality was slightly higher at an average of 19.1% (Table 5). Figure 7 shows the monthly mortality pattern among the goat kids in this intensive rearing system from 2013 to 2015. Higher kids mortality prevailed during the rainy months of March to June and October to December similar pattern reported by Shahrom and Zamri (2012). Major cause of mortality for kids due to pneumonia and coccidiosis infestation. There are also cases of CLA that cannot be resolved because it's always not show clinically infected to the goat. Yearly blood screening test showed that no case of FMD and Brucellosis recorded for goats in this project.

**TABLE 5. MORTALITY RATE OF KATJANG GOAT IN INTENSIVE PRODUCTION SYSTEM**

Goat type	Year 1	Year 2	Year 3	Average
Adult, (%)	4	4	7	5
Kids < 1 year, (%)	13	22.8	21.5	19.1

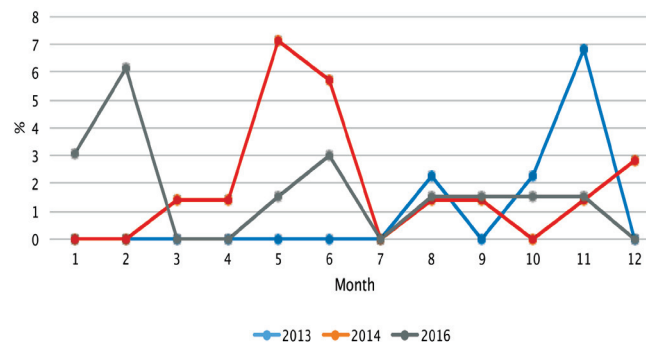


Figure 7. Mortality of Katjang goat kids in intensive production system.

## ECONOMIC ANALYSIS

The total initial cost required to start this project with herd size of 50 does and four bucks was RM 56 400. The net present value (NPV) calculated at 10% discount rate is RM 28 101. The internal rate of return (IRR) for this model is 24%. The payback period is five years. This analysis is made with assumption that oil palm grower did not pay for labour cost because this project is managed by family labour.

## CONCLUSION

Intensive integration of Katjang goat with oil palm is technically and economical feasible. Limited land area faced by smallholder can be overcome with intensive goat farming by cut and carry system. Available feed sources under oil palm plantation such as oil palm frond and natural undergrowth can be used as free feed source for the goats. Small and medium size goat such as katjang goat make it's affordable especially in local market.

## REFERENCES

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For more information, kindly contact:  
 Director-General, MPOB  
 6, Persiaran Institusi, Bandar Baru Bangi,  
 43000 Kajang, Selangor, Malaysia  
 Tel: 03-8769 4400 Fax: 03-8925 9446  
 www.mpob.gov.my