

INTEGRATION OF BARBADOS BLACKBELLY SHEEP IN OIL PALM ON PEAT AREAS

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In Malaysia, sheep is reared based on the traditional way, where they are allowed to roam freely in search of their feed. As a result, sheep production is known to be not an economically viable venture. For many years, sheep production in this country has not shown any significant improvement in comparison to the rest of livestock production despite a significant increase in mutton consumption. In 2008, local sheep production could only supply 10% of the total domestic mutton requirement. The difference was met by importation. Import of mutton had increased from 10 707 t in 2004 to 16 303 t in 2007. The quantity and value of imported mutton are expected to increase in the future with the growth in population. Therefore, efforts should be initiated to increase local sheep production.

A systematic production system for sheep is urgently required that can bring about growth in the sheep population. As sole production seems not to be widely practiced, an integrated production system should be a good alternative. Based on research findings, an integrated production system of oil palm and livestock is a viable venture. As the majority of arable land including peat areas is utilized for oil palm plantations, this provides a good opportunity to utilize the oil palm-planted land for sheep integration. However, peatland is considered a problematic type of soil due to its physical properties. Oil palm productivity on peat areas is slightly lower compared to productivity on mineral soils. Therefore, an effort has to be made to increase the productivity of oil palm on peat through such strategies as livestock integration.

Peat being a bit soft and soggy, only small ruminants such as sheep are suitable for integration. Large ruminants such as cattle and buffalo are not suitable for integration. These large ruminants will cause damage to the oil palm root system which gives a negative impact on palm growth and production. Besides, the soft peat texture also may endanger the cattle or buffalo.

To explore the possibility of integrating sheep in oil palm, MPOB conducted an experiment in 2002 at the MPOB Station in Sessang, Sarawak. The objectives of the study were: to develop a semi-intensive model for integrating sheep production with oil palm on peat, and to ascertain the technical and economic performance of the project.

METHODOLOGY

Selection of Area

To ensure that oil palm and livestock productivity remain at the optimum level, the oil palm in the proposed area must be more than five years old. This is to ensure that the sheep will not be able to graze on the oil palm fronds, causing damage to the palm and impairing its growth. The proposed grazing area should also not exceed 25° in slope so that the sheep will not have to climb uphill. Optimum growth rate will not be achieved if the sheep are forced to climb steep areas on a regular basis.

Sheep House

A sheep house or pen is built with the floor raised at 1.6 m above ground, and 3.6 m in height from the floor to the roof. The approximate area required for an adult sheep is one square meter. The pen should be divided into several rooms or enclosures to separate the sheep based on their age and physiological needs. Rooms should be available to separate rams, pregnant ewes, adults and newly born kids. The pen should be equipped with feed and water troughs. A store is required to keep supplement feeds, minerals and medicines. A water tank is also required for a continuous supply of clean water (*Figure 1*).

Livestock Management System

For integrating sheep in oil palm, the recommended production system is a semi-intensive system.

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Figure 1. A Barbados Blackbelly sheep pen at MPOB Station in Sessang, Sarawak (left). Sufficient space for adults in the pen (right).

For a start, the recommended size of the herd is 50 ewes and three rams for every 10 ha of mature oil palm. In this system, the sheep will be released for grazing during the day and herded back to the pen before sunset (Figure 2). Feed supplements must be supplied when the animals are kept in their pen during the night or during bad weather. The feed supplements are important to ensure that the sheep get sufficient nutrients for normal growth because the animal gets only about 60% of its requirement from grazing during the day. Oil palm fronds can be used as a cheap source of feed supplement. For small ruminants like sheep, the palm fronds can be offered directly after cutting them into three portions and hanging them in the sheep pen at a height which can be reached by the sheep. A commercial feed such as pellets can also be offered to the sheep (Figure 3). The pellets should be stored at the sheep pen, so that they can be ready for use, especially during a rainy day. Minerals and vitamins are also supplied to meet the physiological needs of the sheep.



Figure 2. Sheep are released for grazing in the late morning.

Grazing management. Controlled grazing can be carried out by using an electric fencing system to encircle the paddock. The use of an electric fence is to optimize the grazing of grasses by the sheep in a particular area (Figure 4). If the sheep are allowed to roam freely in an oil palm plantation, they may graze on grasses that are recently sprayed with herbicides. This may expose the sheep to the risk of consuming grasses contaminated with herbicides that may lead to death. The type of electric fence for sheep is similar to the one used in cattle integration except that the wire used is of the tape type and the current is of a low voltage of 1.2 kV.

Before the sheep can be released for grazing, they should be familiarized with the electric fencing system. This process usually takes about five to seven days. During this process, the behaviour of the sheep should be observed. Sheep that are difficult to handle or control must be removed from the herd. This familiarization process is usually carried out in the fenced area around the sheep pen to prevent the newly arrived sheep from escape.

Culling. Culling of unproductive sheep should be done periodically. There are several reasons that cause sheep to be no longer productive such as age, poor birth performance, disease that is not economical to treat, inactivity or obesity. Male kids that reach one year of age should also be removed to avoid inbreeding. Likewise, the ram should be



Figure 3. Sheep chewing oil palm fronds (right) and eating commercial pellets (left) in the pen.



Figure 4. A group of sheep grazing in an electric fenced-off paddock (left), and adult sheep grazing on soft undergrowth (right).

replaced every three years to avoid inbreeding. Culling is required to make sure that every sheep performs at the optimum level for maximum returns.

Health management. Diseases that often affect sheep in this production system are worm infestation, caecous lymphadenitis, bacterial diarrhoea, pneumonia and scabies. Bio-security measures should be implemented to prevent these diseases from spreading in the herd. One practical bio-security measure is by adopting a closed herd management system. This can be carried out by restricting the movement of other animals into the herd. In this approach, the increase in sheep population is achieved through selective replacement of ewes within the herd. A herd-health programme should also be carried out on a regular basis, such as through vaccination, deworming and physical evaluation (Figure 5).

Pasture planting. Based on MPOB experiences at Sessang, the availability of palatable natural undergrowth is insufficient for sheep reared or integrated in oil palm planted on peat. Major natural undergrowth comprises ferns such as *Stenochalena palustris*, *Dicranopteris linearis* and *Nephrolepis biserrata*. Therefore, additional pasture species must be planted to support the sheep's herbage requirements. The easiest to establish is Napier grass that can be planted around the sheep pen. It can also be planted in pockets of empty land found in and around the plantation, such as at the field road reserves or field drain reserves (Figure 6).

TECHNICAL PERFORMANCE

It was recorded that the sheep were conditioned to the electric fence within seven days after they were introduced. It was also observed that when



Figure 5. A newly born kid is orally fed with medicine (left), and an adult is given injection for deworming (right).



Figure 6. Planted Napier grass.

the sheep were released into confined paddocks, they grazed most of the soft undergrowth. The sheep were also very tame and easy to manage.

The average kidding rate recorded was 1.8 kids per ewe per year, and the average birth weight of the kids was 3.0 kg for males and 2.5 kg for females. The average adult weight was 56.5 kg for males and 40.0 kg for females. The average mortality rate recorded for kids less than three months old was 10% per year. For older kids and adult sheep, the average mortality rate was 5%. The Barbados Blackbelly breed was also found to be very hardy, adapted easily to the environment, and fed on whatever sources of feed available in the oil palm plantation on peat.

ECONOMIC ANALYSIS

The economic analysis was based on a 10-year project period. The total initial cost required to start integrating Barbados Blackbelly sheep

production with oil palm is for acquiring the initial animal stock of 50 ewes and three rams for a 10-ha area. This cost amounted to RM 164 600. The internal rate of return (IRR) for this model was 21%. The net present value (NPV) at a 10% discount rate was RM 83 946. The payback period for the project was six years, while the benefit-cost ratio (BCR) was 1.64.

CONCLUSION

Integration of Barbados Blackbelly sheep with oil palm was found to be technically feasible and economically viable. This breed was found to be very suitable for integration in oil palm planted on peat. The technical performance of the breed was satisfactory compared to a similar breed reared on inland soils. Besides increasing the farmer's income through sales of the animals, the integrated production system will also contribute to the national economy through reduced importation of mutton.

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