REGULATION OF LIVESTOCK FARMING IN SABAH: ISSUES AND CHALLENGES

Nasip Eli, Khong Kwai Weng and Martin Oming

Department of Veterinary Services and Animal Industry
Tingkat 7, Menara Khidmat
Jalan Belia
Beg Berkunci 2051
88999 Kota Kinabalu

ABSTRACT

Livestock farming in Sabah once seen as backyard farming and pose no threat to the environment, but with the rapid development in the livestock industry, particularly in monogastric subsector, coupled with rapid expansion of urban and peri-urban area, livestock farming has become the critical issue. Excessive livestock waste as a result of intensive farming system need to be addressed. Although animal waste can be utilized as a manure to improve the physical and chemical properties of soil, it can also cause environmental hazard if not managed properly. It can caused malodour or odour nuisance to environment, surface water contamination, secondary pollution and also religious sensitivity.

In order to minimize the problem, there must be some sort of regulation, existing regulation/by-law mainly focusing on disease control. As the environment issue caused by livestock farming becoming more prominent, the government needs to formulate regulation or guidelines to tackle the problem. With this, come Livestock farming rules 2000 and specific guidelines to livestock farming in Sabah and also guidelines to establish Pig Farming Area (PFA). Amongst the important feature of Livestock Farming Rules 2000 are control of livestock farming, layout plan for pig farm before being licensed and the level of Biological Oxygen Demand (BOD) based on the standard requirement of the Department of Environment and Conservation.

Amongst the important issues and challenges with regard to regulation and guidelines are the public awareness, implementation of the regulation, willingness of the farmer to adopt new technology, high capital investment and repair and maintenance of the treatment plant.

In conclusion integrated approach is required to address the issue, not only from various government agencies, but also from NGO’s, farmer’s association and individual farmer.
1. Background of livestock Industry

The livestock industry in Sabah started from a humble beginning of backyard farming some 25 years ago. Through careful and continuous livestock development projects, today the non-ruminant sector, particularly pig and poultry have expanded rapidly from mere a backyard farming activity to a multimillion ringgit enterprise characterized by highly efficient and intensive operation. Estimated pig Standing population (PSP) is 100,000 heads and poultry as 3,513,100 heads (Table 1). Sabah has attained self-sufficiency in the production of pork, poultry and eggs and to some extend, manages to export to neighbouring countries.

In the ruminant sector especially cattle there was a gradual shift of management system from backyard, extensive free-grazing to a more intensive system where animals are kept in a limited area and fed through cut and carry. Dairy cattle project was introduced in 1980 as an experimental project and later became Dairy Small holder Project. Another interesting development in livestock industry was the introduction of Ostrich farming in the early 1990s.

Table 1. Estimated Livestock Population of Sabah, 1999

<table>
<thead>
<tr>
<th>Species</th>
<th>Number (Head)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>44,837</td>
</tr>
<tr>
<td>Buffalo</td>
<td>50,741</td>
</tr>
<tr>
<td>Goat</td>
<td>37,285</td>
</tr>
<tr>
<td>Sheep</td>
<td>1,900</td>
</tr>
<tr>
<td>Pig</td>
<td>100,000</td>
</tr>
<tr>
<td>Chicken</td>
<td>3,400,000</td>
</tr>
<tr>
<td>Duck</td>
<td>113,000</td>
</tr>
</tbody>
</table>

Source: (Anon.1999b)

The rapid growth of the livestock industry has inadvertently caused on environmental problem-related to the livestock waste generated from the intensive farming system. Livestock waste generated from an extensive or semi extensive farming system does not seem to cause any major environmental problem as shown in table 2, cattle/buffalo wastes amount to 1.4 million metric ton compare to pig wastes about 248,000 metric ton. The problem is further aggravated with the rapid development of the urban and peri-urban area where most of the livestock farms are situated. The total livestock population and the wastes produced per year for selected animal is illustrated in Table 2.

Table 2. Total livestock population and the wastes produced per year

<table>
<thead>
<tr>
<th>Livestock Species</th>
<th>Population</th>
<th>Waste Produce (m.t.) per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry</td>
<td>2.4 millions</td>
<td>178,000</td>
</tr>
<tr>
<td>Duck</td>
<td>0.5 millions</td>
<td>55,000</td>
</tr>
<tr>
<td>Pig</td>
<td>85,000</td>
<td>248,000</td>
</tr>
<tr>
<td>Cattle/Buffalo</td>
<td>97,000</td>
<td>1,416,000</td>
</tr>
<tr>
<td>Goat/Sheep</td>
<td>38,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1,967,000</td>
</tr>
</tbody>
</table>

Source: (Mokhtar and Chia, 2000)
2. Potentials of Livestock Production

Sabah is free from major animal diseases which can cause serious economic losses to the livestock industry in the state. With stringent import regulations and constant surveillance at the point of entry, Sabah managed to keep at bay the Foot and Mouth Disease, which in recent outbreak had caused a serious problem to livestock industry in the United Kingdom and other parts of the world. Sabah also managed to keep away Nipah virus infection that has caused significant impact on the pig industry in Peninsular Malaysia and that episode has also caused a dramatic change in direction of future of pig farming industry. Public awareness to the danger and the importance of prevention of diseases of zoonotic nature that was initiated well in advance by the relevant authorities helps to keep the incidence and damage of zoonotic diseases to its minimum.

Sabah has a vast potential for livestock development. It has 127 grazing reserves with a total area of 21,698 hectares (Awang Salleh, 1991) but most of these areas are not developed and are under-utilized as grazing ground. For potential livestock development, large areas of coconut, cocoa, rubber and oil palm plantations which cover an area of 1.02 million hectares (Table 3) are available for possible integration with livestock as a mean of economic diversification by exploiting the grass and undergrowth which grow under the plantation crops. Disease free status coupled with vast available land is a strong point for Sabah to be a major livestock producer in the future.

Table 3. Agricultural Land Use Sabah, 1997

<table>
<thead>
<tr>
<th>Plantations</th>
<th>Area (Hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Palm</td>
<td>843,952</td>
</tr>
<tr>
<td>Cocoa</td>
<td>94,331</td>
</tr>
<tr>
<td>Rubber</td>
<td>86,109</td>
</tr>
<tr>
<td>Total</td>
<td>1,024,392</td>
</tr>
</tbody>
</table>

Source: (Juin, Yangkat and Laugesen, 2000)

3. The importance of livestock industry

Although livestock industry is not a major contributor to foreign exchange earner for the state, it is playing a significant role in providing food for local consumption. In term of state Gross Domestic Product (GDP), livestock industry contributes about 4 percent which is equivalent to total production value of more than RM 406.17 million.

The largest economic contributor to the state livestock industry is poultry sector which is accounting for approximately 75 percent of the industry. Large commercial enterprises incorporate the principal of vertical integration. Production under control environment in enclosed housing system is gaining more popular. In 1999 more that 28,122 metric ton of poultry meat produced value at RM 195.40 million and 459.5 million pieces of egg worth RM 127.25 million.
Pork production represents the second most important sector. In 1999 this sector produced about 6,154 metric ton for local consumption with estimated value at RM 67.70 million. The trend in the industry now are toward transformation from numerous small scale farmers to fewer huge commercial entities.

In rural area livestock rearing is an important activity to supplement the family income, as the objective of rearing animal is for family consumption, usually the number of animal reared is small and has no apparent threat to environment.

Beef production which is derived from cattle and buffalo, is mainly the activity of the small holders. There are however a number of commercial farms in the state which adopt intensive system such as commercial farm in Keningau. In 1999 about 591 metric ton of beef was produced with an estimated value RM 8.87 million. Dairy industry contributes about 40 percent of local fresh milk requirement which amounting to 4.64 million liters worth RM 6.96 million.

4. Major Livestock sector causing environmental problems

The shift of traditional extensive animal husbandry into intensive animal production activity results in large accumulation of animal waste. In Sabah, the pig sector has been identified as the main sector that contributes to major problem to the environment issue. Although pig waste can be utilized for several purposes such as the production of biogas, bio-fertilizer or as an animal feed, but due to religious sensitivity, these advantages are not practical here, and therefore the wastes are collected in open-air pits called waste lagoons, where it is minimally treated. The presence of large amounts of partially decomposed organic material within the faces may cause health risks and also provide a favorable environment for bacteria to propagate.

In a survey of pig farms in Malacca, Malaysia (1980), approximately 68 percent of the farms had constructed retaining ponds for pig wastes, however these pond were considered too small and thus over-loaded and non-functional.

In order to minimize environmental problems cause by pig waste, there should be proper animal wastes management system such as improving the housing by adopting the Pit Recharge System and Concrete Floor Unit. When it comes to wastewater treatment system the use of modern methods such as Three-step Piggery Wastewater Treatment (TPWT) Process, and with this method, wastes effluent can be as low as 50 mg/L and pH can be maintain within acceptable level at around pH7. The other option is the adoption of the Sequencing Batch Reactor (SBR) with an Automation System. The SBR is a single wastewater treatment system with the functions of stirring, aeration and settling.

To reduce odour emitted from the farm, one practical approach is a close housing system with a regulated ventilation. By using high efficiency fans at one end of the building, fresh air is sucked in from the outside environment, passes through a cooling pad to reduce the temperature before being delivered into the building. At the other end of the building, the exhaust air is pushed out by higher pressure within the building and filtered through a net to
remove dust and other particles. The system is apparently successful in reducing the odor emitted from the farm to a significant extent.

Large commercial enterprises incorporating the principal of vertical integration in poultry production which include day old chick production, feed mill, poultry processing and marketing is one of the main sector that may cause environmental problem. Although at the moment all poultry wastes are collected for use as bio-fertilizer in agricultural crops and organic vegetables and may cause no major environmental hazard, the uncontrolled discharge, such as discharge waste from poultry processing plant, indiscriminate dumping of chicken carcasses such as the case in Kampung Kabang and activity of contract farming to small holder farmers may cause malodour and provide a suitable breeding environment for vectors and other pathogenic organisms.

Although the ruminant (cattle, buffalo) sector is currently still in its rather extensive management system, where animal density is rather low, and nearly all wastes produced are being recycled back to the grazing land, hence maintained in balance and causes no major environmental hazard, with the emerging of a number of commercial farms adopting the more intensive system, it is thus considered to be an ‘emerging’ sector that would cause an environmental problem in the future.

5. Environmental problems cause by livestock farming

5.1. Water Pollution. Main environmental problem cause by livestock farming is water pollution, according to The Malaysian Environmental Quality Report, 12 rivers in the state were polluted with ammoniac nitrogen (NH3-N) due to livestock farming and domestic wastes in 1997. Water pollution cause by livestock farming occurred due to malfunction of waste lagoon or accidentally spill over from flooded lagoon or deliberate flushing of wastes directly into river system. Water may turn reddish brown and may destroy the fragile ecosystem. Pollution from nutrients contained in animal manure, namely phosphorous and nitrogen is one of the most serious problems, leading to excess algae growth, robbing water of oxygen which may lead to mass destruction of fish.

5.2. Malodor/air pollution. The anaerobic decomposition of stored animal wastes generates various volatile metabolic compounds of which a dozen contributes to odour, in particular hydrogen sulfide (H2S) and ammonia. These can cause continuous source of strong, persistent and unreasonably offensive hog/poultry odours. The resulting of air pollution is interfering with surrounding areas. Air pollution in the form of ammonia nitrogen can cause respiratory illness in the neighbourhood up to two miles away from the site.

5.3. Potential source of diseases
Beside serious environmental problem, animal waste also may become a source of various diseases such as infectious worm larvae hatched from the worm eggs passed out with the faeces, contamination encrusted with organic matter is an ideal breeding ground of harmful bacteria. Arthropods such as flies, lice, fleas that are attracted by animal waste may trigger outbreak of infectious diseases, because they are the vectors to transmit diseases such as viruses, rickettsiae, protozoa and helminthes. Animal feed
which is fortified with heavy metals such as Copper and Zinc most of which are accumulated in the waste lagoon may cause poisoning.

6. Animal waste as valuable resource

Although animal waste may contribute to serious environmental problem and usually considered as a liability, but it can be an asset too if managed properly. Below are the some important applications of animal waste.

6.1. In agricultural activities, animal waste can be used to improved physical and chemical properties of the soil, particularly with those with low organic matter. It improves chemical composition of the soils, increase soil fertility and ability to hold water, thus stimulating plant growth. It also buffers the soil against pH changes and increase resistance to compaction. Livestock waste contain valuable plant nutrients such as nitrogen (organic N and ammonium N) Phosphate (P2O5) potash (K2O) (Table 4) and other micro-nutrients such as Mg, Ca, Mn, Fe and Zn.

Table 4. Nutrient production as excreted by mature pig

<table>
<thead>
<tr>
<th>Element</th>
<th>Kg/animal/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen</td>
<td>0.033</td>
</tr>
<tr>
<td>Phosphorous P₂O₅</td>
<td>0.026</td>
</tr>
<tr>
<td>Potassium K₂O</td>
<td>0.026</td>
</tr>
</tbody>
</table>

Source: (Anon. 2001)

6.2. Livestock waste is also a good source of fuel production. This can be done through either direct combustion after drying or by conversion into biogas. As an example the manure of 100 pig unit can generate up to 9600 litres of usable methane per day, and dung collected from 10 feedlot cattle yields 17 cubic meters of biogas which is sufficient to meet daily cooking and lighting needs for a family of four.

6.3. Livestock manure can also be a source of animal feed by either feeding it to fish and livestock (with either additives) or indirectly as a substrate for cultivation of larvae of insect and algae in manure prior to processing it into animal feed.

7. The importance of Regulating livestock farming

As pointed out, pig sector is being identified as the main sector that cause environmental problem, but on the other hand pig sector is also considered as an important contributor to the overall state economy. In this type of situation we have several options, if economic factor is not the main priority, then the state can adopt a strong stand to totally ban pig sector as adopted by Singapore. But normally economic consideration overrides ecological factor, so the practical option is to allow pig sector to develop and to take necessary measures through legislation and guidelines to minimize the environmental damages.

According to existing regulations, the operation of livestock farms rest on the land-use code and is governed by the local government by-laws. There is no guideline and regulations on the farming practice especially when it comes to the discharge of pig farm effluent. But the department of Environment Conservation has advised all pig farm operators to contain their
pig farm run-offs into proper wastewater retention facilities for aerobic treatment before it is discharged into rivers or streams.

7.1. Conservation of Environment Enactment. Conservation of Environment Enactment 1996 was created to make provisions relating to conservation of environment in which the livestock farm waste pollution is to be monitored by the Department of Environment Conservation for its effectiveness.

7.2. Livestock Farming Rules, 2001. In the meantime the Department of Veterinary Services and Animal Industry is well aware of the need to control and rectify irregularities in the livestock farming practices. Base on this, Livestock Farming Rules, 2000 (Draft) was introduced. This regulation was created under the existing Animal Ordinance 1962 (Amended 1998). Under this legislation, all livestock farms shall be operated under the permit of Department of Veterinary Services and Animal Industry, Sabah (DOVSAI).

7.3. Pig farm area (PFA). Another measure to curb pig waste problem is by introducing a PFA concept. The concept includes feed mills, animal breeding and rearing units, waste treatment plants and slaughterhouses or abattoirs confined in one enclosed area. It means in time to come, one will only see truck loads of animal feed stuffs going into PFA at entry gate, while at the same time, containers or truck loads of pork are being shipped out at the exit gate. This is a long term strategy undertaken by the government for the abatement of animal waste. The concept allows an opportunity for restructuring the present pig farming practices into an orderly and systematic way. The important guidelines for the establishment of a PFA are as follows:--:

7.3.1. PFA should be far away from housing estates and other development projects
7.3.2. PFA should have all the basic infrastructures like roads, water and electricity supply
7.3.3. PFA should have a 100 meter wide perimeter buffer zone
7.3.4. To maximize land usage, the optimum land size is 400 – 500 ha for 250,000 standing pig population
7.3.5. A slaughterhouse will be built within the PFA
7.3.6. The Environment Impact Assessment (EIA) study is also required with the views/justification from all the relevant authorities, and
7.3.7. Several alternative waste treatment methods will be recommended to the farmers. Farmers in the PFA will be required to construct ‘on farm’ waste treatment facilities to treat their waste output to an acceptable level of BOD before channelling it to a central waste treatment plant provided by the PFA. Recommended waste treatment methods are Total Biological Digestion, Anaerobic Biogas Generation cum Aerobic Digestion and Solid sediment and removal.

7.4. Livestock Farming Guidelines In Sabah. This is a specific guidelines to PFA, the practical approach on ground in implementing the regulations and guidelines. It involves the land authority, the Department of Environment and Conservation, local authority and other relevant government authorities, to give their professional views before being approved by higher authority.

8. Issues and challenges

What are some of the major issues and challenges facing the regulation of livestock farming in Sabah at the moment?, these can be briefly summarized as follows:
8.1. Trained personnel are needed. The personnel involved in the implementation of the project should be well equip with technical know how as well as legal procedures. Lack of trained personnel may lead to inefficient execution of duties and responsibilities.

8.2. Cooperation from of all sectors. With a regular highlighting of the environmental issues in the mass media, especially television and newspapers, will greatly contribute to public awareness in the importance of clean, hygiene and balance environment. On the other hand the farmers themselves will also realised their obligation of the society and hence it will be easier for the authority to regulate livestock farming.

8.3. Land conditions issued to the owner. The current practice to land alienation for specific purposes, such as for agriculture or animal husbandry practice at certain area need to be study. Issuing of land title for animal husbandry purposes that is surrounded by future residential development for example, may cause unnecessary problem in years to come, because the farmer will have to give way for the development of the residential land.

8.4. Compensation to close and relocate the farm. Another important aspect with regard to regulations of livestock farming is the compensation issue. Although under certain regulation the farm need to be closed or relocated to other areas when there is complain from the surrounding area. There is a need to consider their capital investment to establish the farm which was established much earlier prior to the recent development taking place in the surrounding area.

8.5. Licensing of livestock. With the present farming and waste treatment system practiced by pig farmers, a large number of them may not be able to pass the necessary requirement, hence this may cause hardship to the farmers. Licensing enforcement should be done in stages.

8.6. Monitoring of the farm performance. Due to the limited number per farm to be enforced, production efficiency should be emphasized, thus the need trained personnel to implement function. Proper recording system has to be maintained by both farmers and the authority.

8.7. Sanctions and penalties. Stringent sanctions and penalties may be useful to combat unhygienic activities, but it may not be effective to regulate a high investment enterprise. This will discourage the investors and the people will have to pay the higher imported pork price to feed the pork eating population which is almost 50 percent of the total population. Import of beef and mutton may also increase as a substitute to pork.

8.8. Pig farm area (PFA)

The concept of PFA is very ideal and all effort should be geared toward realizing it, but unfortunately it is very difficult to implement due to several factors that need to be address thoroughly, and amongst the important points are:

8.8.1. Suitability of the available land. In Sabah main issue why PFA cannot be implemented is because of the lack of suitable land. At the moment only one area has been identified in Sandakan but the area is just too small to accommodate the present number of farms.

8.8.2. High capital cost. In order to establish a PFA one of the main condition is that basic infrastructure such as road, water and electricity facilities should be provided by the authority. In the Eight Malaysia Plan it was budgeted for the establishment of one unit of PFA required about RM 200 million. So far there is no favourable indicator that the fund will be forth coming. On the other side, the farmers are requested to
develop their own lot in the PFA area through soft loan given by the authority, but so far there is no favourable development in sight.

8.8.3. Outbreak of the disease within PFA. In any intensive farming system, slight lapse in the hygiene management could lead to serious disease outbreak, if there is no safety valve, the disease may spread rapidly from one farm to another.

8.9. Relocate and consolidate the pig farms. Currently there are 101 pig farms in Sabah (Table 5). Those farms situated near river system and do not have proper waste management system must be closed and relocated to Pig Farm Area (PFA). Those with proper waste management system may be allowed to operate and be gazetted as the in-situ PFA with all the necessary facilities accorded to PFA. Reducing the number of pig farms, but increasing the number of pig per farm is the target. But this can only be achieved if the smaller farms are willing to merge and be consolidated.

<p>| Table 5. Distribution of Pig Farms in Sabah |
|-----------------------------|------------------|</p>
<table>
<thead>
<tr>
<th>District</th>
<th>No of Pig Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kota Kinabalu</td>
<td>17</td>
</tr>
<tr>
<td>2. Sandakan</td>
<td>18</td>
</tr>
<tr>
<td>3. Tawau</td>
<td>12</td>
</tr>
<tr>
<td>4. Beaufort</td>
<td>1</td>
</tr>
<tr>
<td>5. Keningau</td>
<td>2</td>
</tr>
<tr>
<td>6. Kudat</td>
<td>9</td>
</tr>
<tr>
<td>7. Lahad Datu</td>
<td>5</td>
</tr>
<tr>
<td>8. Papar</td>
<td>4</td>
</tr>
<tr>
<td>9. Penampang</td>
<td>5</td>
</tr>
<tr>
<td>10. Ranau</td>
<td>2</td>
</tr>
<tr>
<td>11. Sipitang</td>
<td>1</td>
</tr>
<tr>
<td>12. Tenom</td>
<td>8</td>
</tr>
<tr>
<td>13. Tuaran</td>
<td>10</td>
</tr>
<tr>
<td>14. Semporna</td>
<td>1</td>
</tr>
<tr>
<td>15. Kota Marudu</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>101</td>
</tr>
</tbody>
</table>

Source: (Khong, 2000)

9. Conclusion

Based on the above discussion, it was concluded that:

9.1. Sabah has the best potential for livestock production

9.2. Livestock industry is important to the State of Sabah because it is contributing to RM 406.17 million for the state economy

9.3. At present the pig sector has been identified as the major threat to environmental pollution problem and water pollution and malodour pollution are the main issues, however animal waste if managed properly could be an asset to the state

9.4. It is important to regulate livestock farming activities in the state to ensure these activities are being carried out in an orderly manner with minimal level of pollution

9.5. Some of the main issues and challenges in regulating livestock farming are

9.5.1. Need more trained personnel
9.5.2. Cooperation from all relevant government organisation, NGO and also individual farmer.
9.5.3. Specify land conditions accordingly
9.5.4. Compensation to close and relocate the farm

References