Symposium 1: Enhancing Livestock Organic Farming

Editors: K. Boonyanuwat and S. Phetdikhai
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Symposium 1
Enhancing Livestock Organic Farming
**Symposium S1**  
“Enhancing Organic Livestock Farming”

**Chairperson:** Dr. Boonlom Cheva-Issarakul  
**Rapporteur:** Dr. Thumrongsakd Phonbumrung

**13.30-14.00**  
Organic Animal Husbandry: A Roadmap to Asian Country  
Dr. Mahesh Chander  
Principal Scientist & Head Div. of Extension Education, Indian Veterinary Research Institute Izatnagar-243 122(UP), India

**14.00-14.30**  
Small Scale Agro-ecological Farming for Local Organic Livestock Food Production System in Thailand  
Mrs. Jintana Indramangala, Thai Organic Agriculture Foundation

**14.30-15.00**  
The Role of Organic Livestock on Agricultural System as Sufficiency Economy Philosophy: Case Study in Mae Rim Watershed, Chiangmai  
Mr. Tawan Hangsoongnoen, Farmer at Rainbow Farm and Lecturer

**15.00-15.20**  
Coffee Break

**15.20-15.50**  
Low Input Breeds: Research to Improve Health and Performance in European Organic and Low-input Livestock  
Professor Peter Rowlinson on behalf of  
Dr. Gillian Butler University of Newcastle, Newcastle upon tyne NE1 7RU, U.K.

**15.50-16.20**  
Future Challenge of Organic Dairy Farming and Processing Movement for Small Scale Production  
Mr. Prutti Kerdchucheon, Dairy Home Co., Ltd

**16.20-16.40**  
Transition to Certified Organic Dairy Farming for Smallfarmer: A Case Study of DPO Thailand  
Dr. Chockchai Chaimongkol, Dairy Farming Promotion Organization of Thailand
Organic Animal Husbandry development: A Road map for Asian countries

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ABSTRACT

The Asian countries have demonstrated impressive progress in organic agriculture development in terms of area, production and export revenues and ever increasing number of certified organic producers in these countries. Apart from Non Governmental Organizations and private sector, the government agencies in most of the Asian countries have taken steps to promote organic agriculture. But, this progress has been limited to a few export oriented high value commercial crops like cotton, spices, tea, Basmati rice, herbs and honey. Organic livestock production is not developed in most parts. Organic animal products are only available in some places (e.g., Japan, South Korea, Taiwan, and China). The majority of production and export in the region continue to be primary products except for Japan, South Korea, and Taiwan. Whereas, the Asian countries rear huge livestock population with species and breed diversity, as also the production practices of livestock farmers in these countries are extensive and closely compatible with the standards of organic livestock production. It’s well recognized need that alongside crops, animal husbandry too needs research and developmental efforts. Thus, a situation analysis has been done towards a road map for organic livestock production in Asian countries. The appropriate policy interventions, capacity building measures, consumer awareness and marketing support is required to develop organic animal husbandry, for domestic consumption initially, since, the export of livestock products from most of these countries is already handicapped due to several reasons. This paper overviews the developments and sets out the priorities towards development of organic animal husbandry in Asian countries.

Key words: Problems, prospects, organic livestock, Asia

INTRODUCTION

The global organic market increased to 59 billion US$ in 2010. Currently 37 million hectares and another 43 million hectare non agricultural land (primarily wild harvest) is under organic agricultural management. The region with the most organic agricultural land is Oceania, with 12.15 million hectares, followed by Europe with almost 9.3 million hectares, Latin America (8.6 million hectares), Asia (3.6 million hectares), North America (2.7 million hectares), and Africa (more than 1million hectares). There are many success stories of organic agriculture development in Asian countries but livestock sector has not yet come up on organic lines in these countries. For instance, India has registered good progress in export of organic agricultural products save livestock products (Fig1.). It is important therefore to explore the opportunities and tackle the problems towards making a way for organic animal husbandry in Asian countries too.
Livestock Production in Asia: An overview

Asia has the fastest developing livestock sector among the regions of the world. Growing incomes, expanding urbanization and ageing, but nevertheless expanding populations fuel the rapidly growing demand for livestock products, particularly meat. There has been a dramatic shift from diets which were formerly predominantly vegetable-based towards those of animal protein. This shift has resulted in an ongoing transformation of the livestock sector in the region, with subsequent implications for the feed resource and other inputs. These shifts raise a number of new and evolving concerns, particularly regarding environmental issues, the provision of marketing opportunities and the need to balance feed production with demand. The share of livestock in Agricultural Gross Domestic Product in Asian countries varies between 20 and 30% and is increasing due to rising incomes and enhanced demand for animal based foods. The contribution to household income from livestock especially in drylands in India has been estimated to be 34%. The growth rates in the livestock sector in Asia during the last 20 years have been robust and higher than that of crop agriculture (Table 1). The annual growth rates of livestock for 1985-94 and 1995-2005 in Asia were higher than the world average. The growth rate has been higher in spite of poor investments (Taneja, 2005).
Table 1: Compound annual growth in livestock versus crops

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Asia and the Pacific is not only by far the biggest region (in terms of human population) but it is also extremely diverse. As reported by Steinfeld (2006) regarding the habits and animal protein consumption by the people in Asia and Pacific, during 1985-1995, the requirements have increased to 40.5, 14.3, 7.8, 5.4, 3.8 and 1.4 kg/year/caput for milk, pork, eggs, poultry meat, beef/buffalo meat and small ruminant meat, respectively, and the annual growth rates per capita consumption have exceeded 4% with exception of milk. As per Devendra and Thomas (2002), in Southeast Asia, the total rain-fed area is 99 million ha and in South Asia 116 million ha. In Southeast Asia, the rain-fed area (as a proportion of total land available) ranges from nearly 63% in Indonesia to 97% in Cambodia. In South Asia, the corresponding values are from 27% in Pakistan to 84% in Nepal. Only in Pakistan and Sri Lanka does the percentage of irrigated land exceed that of the rain-fed areas. However, in absolute terms, the largest amount of irrigated land (43.8 million ha) is found in India. The contributions of rain-fed production, excluding Pakistan, to Agricultural Gross Domestic Product range across the region from 16% in Malaysia to 61% in Myanmar. Most of the resource-poor farmers engaged in rain-fed agriculture are smallholders, whose farms vary in size from 0.5 to 4.3 ha, which depend on livestock for livelihood to great extent.

In Asia, annual crops and perennial tree crops are grown, and both ruminants and non-ruminants are integrated into these systems. However, on the small farms, ruminants are more widely reared than non-ruminants. Most of the total population of large and small ruminants are kept on mixed farms in the region, which is favourable attribute for organic production. Some 69% of cattle, 64% of goats and 46% of sheep are raised on farms of 5.0 ha or less. On the other hand, pigs and poultry constitute advanced animal industries in many countries in Asia. Examples of integrated annual crop-animal systems include rice/wheat/cattle/sheep/goats in India; rice/goats/ducks/fish in Indonesia; rice/buffalo/pigs/chickens/ducks/fish in the Philippines; rice/vegetables/pigs/ducks/fish, rice/ sugarcane/dairy/fish in Thailand; and in Vietnam, vegetables/goats/pigs/ducks/fish. Examples of integrated perennial tree crop-animal systems include rubber/sheep in Indonesia; oil palm/cattle in Malaysia; coconut/sheep/goats in the Philippines; and coconut/ fruits/cattle/goats in Sri Lanka. In the rain-fed annual cropping systems, ruminants graze native grasses and weeds on roadside verges, on common property resources or in stubbles after the crop harvest. There are a few examples of improved pastures being utilised in these systems. Crop residues and by-products are also fed through the year or seasonally,
depending on the availability of grazing land. Animals are tethered, corralled or allowed free access to grazing. In areas of intensive cropping, stall feeding is practiced. An estimated area of about 210 million ha is found under perennial tree crops in Southeast Asia (Devendra et al., 1997). Non-ruminants in these systems mainly scavenge in the villages on crop by-products and kitchen waste. However, village systems can evolve into more intensive production systems depending on the availability of feeds, markets, and the development of co-operative movements. This is evident in both Southeast Asia (e.g. Indonesia) and in South Asia (e.g. Bangladesh). In areas where root crops are produced, pig production is based on cassava and sweet potato.

According to Wanapat (1999), livestock-crop based production systems in Thailand could be classified in accordance with their management practices and targeted goals. The efficiencies of the production systems subsequently depend on availability of on-farm resources, skillful management and market outlets. With the rapid growth of population and as a consequence, higher demand of food especially animal protein sources are required and produced. In this scenario, many countries in Asia have made development plans and animal production policies. For instance, Thailand, a country situated in the heart of the Indo-china Peninsula, covers a total area of 518,000 km. and has a population of about 63 million people. Despite the country’s rapid development and increased GNP of 8% per annum, the majorities of people (80%) still reside in rural areas and engage in agriculture. Under the prevailing conditions and considering the available farm holding area together with high land prices, any increase in agricultural production is envisaged to come per land unit used or per livestock unit raised. Under the 10th National Economic and Social Development Plan (2007-2011), livestock production aims to increase farmers’ income and improve their standard of living. The national policy emphasizes an increase of dairy, beef cattle, and to increase buffalo production for meat in addition to draft power, respectively. Commercialization of swine and poultry production has been established and the product exported particularly those from chickens and pork.

Organic farming in Asia

Organic products, both animal and crops are increasingly attractive to farmers with high lucrative market values, thus, organic agriculture production and trade is rapidly expanding world over. However, in Asian countries, organic agriculture is largely confined to high value commercial crops like spices, herbs, coffee, tea, cotton and cereals like Basmati and Jasmine rice, produced largely for the export market. Many Asian countries notably India, China, Malaysia, Sri Lanka and Thailand currently are exporting organic food products to EU, USA and other developed countries. The domestic demand too is picking up in these countries since the elites and health conscious consumers are increasingly looking up for health foods including organic products. Therefore, agricultural Research & Development agencies are gearing up to meet the requirements to increase the production and supply of organic food in these countries. Such developments, however, have little impact so far on livestock sector though animals as a part of nutrient cycle are central to organic production. Since, the export prospects of even the conventionally produced livestock products from developing countries to developed nations are not bright currently for the variety of reasons; the organic livestock production has not been paid enough attention by the policy makers and the promoting agencies. But the situation may not remain so in coming years since the organic farming may require livestock to be raised in organic ways as well. Besides, in near future, there may be an increase in domestic demand for organic livestock products for the reasons of food safety and animal welfare considerations. This would mean an increasing
activity in the area of knowledge development and dissemination for augmenting supply of organic livestock products even in developing countries of Asia. Much of the gap in knowledge in the area of organic animal husbandry may be filled up, if knowledge on organic livestock production is shared among stakeholders through networking at local, national, regional and international levels.

As summarized and concluded by Devendra (2004a) with Asian perspective, the growing importance of organic farming is recognized. In particular, attention has been drawn to the interface between organic resources from both on and off the farm, in which the provision of nutrients and energy from feeds are especially important and dominate in mixed farming systems, which are predominant throughout Asia. Nutrient flows and nutrient dynamics have therefore become critical areas for research and development attention. China reigns supremely in this regard, especially in small farm systems involving pigs, chickens and ducks, where, traditional systems of production are combined with efficient resource use in sustainable production systems. On the other hand, there is little reference to organic products, notably milk and meat from ruminants. But, in Asia, there is an increasing trend on the use of herbs to replace antibiotics both for non-ruminants treatments and/or growth stimulants and as rumen manipulators to increase rumen fermentation efficiency and increase animal products quantity and quality particularly with higher conjugated linoleic acids in meat and milk. Such developments are likely to create more space for the development of organic animal husbandry in the region.

**Organic Animal Husbandry Development: Initiatives in Asia**

Asian countries have natural advantage in converting to organic systems, when compared to many developed regions, largely due to low input use in most of the countries and rich genetic diversity in plant and animals. Asia with more than 1,400 breeds has over 27% of the known farm animal and poultry genetic resources. It has 97% of world’s buffaloes, 36% of cattle, 64% of goats, 40% of sheep, 60% of pigs and 54% poultry. Among Asian countries, Japan has taken a lead in developing its organic livestock sector along crop farming. Japan has the third largest market for organic foods next to EU and the USA. Recently, Japan revised its organic standard regulation into a strict legislated law, in which a penalty measure is added for violators of organic labeling regulations. Japan has also developed its livestock standards and some activity has been going on there for development of organic livestock production system. Other Asian countries viz. China, India, Israel, Republic of Korea, Taiwan, and Thailand also have implemented their own organic regulations but have not yet legislated them into law. Malaysia has finalized its regulation, but has yet to fully implement it, while Indonesia and other Asian countries are either in the process of drafting regulations or about to be more active in this direction. As such, the Asian countries are at different levels with respect to organic agriculture development in these countries. For instance, India has developed its own National Standards for Organic Production (NSOP), launched a National Programme of Organic Production (NPOP) and also established a National Centre of Organic Farming (NCOF), leading to boost in organic production and exports. However, the efforts are needed to develop organic animal husbandry especially in the areas where chemical input use in agriculture is bare minimum due to dryland conditions.

With increasing demand and potential markets for organic animal products, the government launched “National Animal-Crop Organic Farming Project” for 5 years (2005-2009) in Thailand. This project is aimed at producing organic products for exportation and
consumption at local level by involving and supporting more research activities and networking of stakeholders involved in this system. So far, technical meetings, workshops, exhibitions have been organized on organic production to develop organic crop and animal production. In addition, academic institutes have been improving, modifying and developing new curriculum in animal organic farming aspects in order to increase qualification and experiences of the students, technical personnel as well as stakeholders (Wanapat, 2005).

China too has established an Organic Food Development Center (OFDC), founded in 1994, which is specialized organic research, inspection and certification organization that has been accredited by the IFOAM. OFDC also extends its inspection and certification service to clients in Hong Kong, Thailand, Malaysia, Korea, etc. As such, China is promoting organic farming in very scientific ways by creating appropriate mechanisms for research, marketing and organic inspectors’ training, leading to a significant export of organic products from China to many developed nations in recent past. China has experienced an incredible organic product market growth rate of 30.57%. This means that by 2015 the organic food consumption in China will reach USD 24.8-59.4 billion. The trend of the consumption of organic foods reflects the yearning of the people for the organic lifestyle. The Satine as a leading brand in the organic dairy industry in China, not only has been committed to promoting the development of the Chinese domestic organic industry, but also seeks to gain further recognition for Chinese dairy products in the international market. Satine has envisaged to focus its efforts on promoting the development of the Chinese organic industry, creating a healthier organic environment to bring an increase in assurance and more high-quality organic dairy products into international market. Beijing Green Yard Organic Dairy Farm is yet another organic dairy venture in china, owned and operated by Beijing Green Yard Ecoagriculture Development Co., LTD. Beijing Green Yard Ecoagriculture was established in 1998. It began to work with China Agriculture University in developing organic milk and its production system in September, 2004. On December 27, 2006, Beijing Green Yard Organic Dairy Farm was approved by the government departments concerned and got all the certificates necessary for organic milk production and processing, making it the first organic dairy farm in China.

The understanding and experiences of all stakeholders needs to be shared with others in the region by amalgamating and strengthening the existing groups through networking for organic animal husbandry development. To benefit from this emerging system of food production, producers in developing countries must build their capacity and take into account their natural advantages for organic livestock production (Chander et al 2011).

Organic livestock production: an overview

Organic livestock production is mostly confined to a few developed countries, where the demand too is increasing for such products. Many Asian countries especially the developing ones including India have impressive livestock strength and other favourable factors to their advantage yet these countries find difficult to export their livestock products, since international trade in livestock from the developing world is a risky business as far as organic livestock products are concerned (FAO, 2002 & Harris et al, 2003). An exporter must have an assured certified supply chain in order to successfully enter international markets. For instance, the need to have a completely organic supply chain could present a problem for export of organic meat from most of these theses countries. Large-scale commercial farms usually undertake most organic livestock production for export; whereas, livestock sector in many developing Asian countries especially is largely dominated by the small scale producers with little risk bearing ability and resourcelessness. Moreover, the self-sufficiency
of organic livestock products in EU may lead to reduced import demand, thus, constraining the growth of organic livestock sector in these countries.

The developing countries in Asia need to make sustained efforts, more than what is being already done in case of other agro products to make its presence felt in organic livestock production. One way could be to develop organic livestock sector initially for domestic consumption so as to move gradually to organic livestock production for export. It has been reported that the local livestock production practices especially in drylands and mountainous regions of India are very close to organic production practices and compliant to organic standards to a greater extent (Chander and Mukherjee, 2005; Chander & Wanapat, 2006; Chander et al, 2007; Chander & Subrahmanyeswari, 2007; Chander et al, 2008). Such areas may be targeted to develop as hubs of organic animal husbandry, since; it will be comparatively advantageous over intensive production. The success stories from other developing countries may help Indian producers to switch over to organic livestock production. For instance, among Latin American countries, Argentina is in forefront of organic production, where, alongside the vegetables and fruit market, there is growing interest in animal products. Here, organic milk production increased in 2003 and although numbers in the organic beef herd declined slightly in 2003, exports of organic beef increased from 50 tonnes to 270 tonnes, the majority going to the UK (SENESA, 2003). The FAO too recognized that among developing countries, the largest and most advanced organic livestock sectors are reported in Argentina and Brazil. According to the Brazilian Beef Association, there are approximately 2,10,000 animals being farmed organically in the country. If 2 ha pasture/animal is required, that there are at least 420,000 ha of pasture under organic beef production (Euclides, 2004). Elsewhere, only limited data are available; however, it is evident that interest in organic livestock products is on the rise in response to not only strong demand for organic products in national markets and export markets, but also to the potential it can offer for maintaining soil fertility (FAO, 2002). The Asian countries can move forward with simultaneous development of export and domestic markets, initially focusing on the domestic consumers of milk and meat products. The countries like South Korea, Japan and Israel can take a lead in development of organic livestock production in Asian region.

Making a case for organic livestock products for Asian consumers

The growing consumer interest in good quality food products in across Asia signals the need for developing domestic market for local consumption of organic foods. With rising literacy, income and awareness on food quality generated by the mass media like TV, people are increasingly becoming quality conscious. Also, they are increasingly showing their willingness to pay for good quality products. For example, people readily pay extra money for unadulterated milk in India, which is not necessarily organic milk per se. This trend indicates that there is good potential for organic livestock products for local consumption. The enterprising farmers are now ready to experiment on new ideas on production and marketing, wherein organic livestock products like milk, meat & fish ideally fit. Just like marketing of FMCG and other industrial products market segmentation can be done by the farmers by supplying products to different categories of consumers with varying prices. It is expensive for intensive livestock producers to convert to organic production, but converting extensive, pasture-based systems could become economically more attractive, if price premiums could be captured for organic meat and livestock products (Scialabba & Hattam, 2002). The growing interest in eating out especially by visiting ethnic food jaunts, looking out for something unique, local and something which is natural and healthy while being environmentally safe offers hope for the production and supply of organic livestock products.
for domestic consumers. The domestic market development is the key for the development of organic animal husbandry in India. The growing market for organic cereals, vegetables, fruits, spices, pulses in Indian metros can be successfully extended to organic livestock products too (Chander et al, 2012).

**Need for Asian Network on Organic Animal Husbandry**

The Network for Animal Health and Welfare in Organic Agriculture (NAHWOA), funded by the EU and formed during 1999-2001 by the European countries is perhaps the finest example available so far in the area of organic livestock production development (www.veeru.reading.ac.uk/organic/). The project brought together experts from 17 research institutes in 13 European countries to undertake Research and Development activities while addressing many potential researchable issues through coordinated efforts. The results so obtained from the research work were shared through 4 thematic workshops in different countries within the Europe. The NAHWOA was followed by SAFO (Sustaining Animal Health and Food Safety in Organic Farming), which is yet another European Commission funded concerted action currently active to improve food safety and animal health in organic livestock production systems through active communication of research results and conclusions including the development of subtle EU-standards on organic livestock production (www.safonetwork.org). Such initiatives results into a knowledge pool covering various dimensions of organic livestock production, which is very useful as well for the other countries interested to develop organic livestock production. Can Asian countries, as an interested group learn among others from these two networking experiences to develop organic animal husbandry systems in these countries?

In Asia, it will be difficult for many countries to develop organic livestock production by their own because of the lack of expertise and resources. However, much of the problems can be overcome, if these countries form a network. The Asian Research Network on Organic Agriculture (ARNOA) exists but it needs to be activated for Organic animal husbandry development as well. In India, a network project involving 9 State Agricultural Universities (SAUs) and 4 institutes of Indian Council of Agricultural Research (ICAR) was implemented, but it mainly focused on organic crop production. A small beginning on networking for organic animal husbandry was initiated by the author, wherein, the Veterinary colleges (36) and animal science institutes of Indian Council of Agricultural Research (ICAR) were requested to nominate faculty and scientists to join the network for sharing information on organic animal husbandry. The ICAR wish to address research issues concerning organic agriculture including animal husbandry under Megaplatform on climate resilience agriculture during the 12th Five plan of India (2012-17). The Asian countries may come forward to form an Asian Network on Organic Animal Husbandry (ANOAH) with wider mandate to develop organic livestock sector alongside of organic crop production in these countries to facilitate sharing of experiences, exchanges of visits and training workshops.

The Agricultural universities, animal science institutes, other Research and Development Institutions engaged in livestock development in Asian countries may join hands to form ANOAH. To begin with, the potential and constraints of organic livestock production with respect to each country in the region may be explored by commissioning country papers on the lines of Chander (2005), Chander & Mukherjee (2005), Chander et al
(2011) and Chander et al (2012). Then, the expert groups may be formed and discussions encouraged through networking workshops to develop a framework for the development of organic animal husbandry, using the experiences in EU, USA, Germany, Australia and other countries including developing ones like Argentina, Brazil, Cuba, Mexico etc where, organic livestock production has taken a formal shape. The Networking experiences like NAHWOA and SAFO are worth taking note of while moving ahead with forming an ANOAH. The institutions like UN agencies (FAO & UNDP, in particular) and multilateral donors may fund such initiatives to meet larger goal of sustainable development (Chander & Metha, 2006).

The emerging opportunities

FAO & Organic Agriculture

The international agencies like FAO, UNDP, IFAD, UNEP, UNCTAD, The World Bank has taken note of developments in the field of organic agriculture and designing suitable needed interventions at their own levels. In fact, the FAO of UN will release new research on organic livestock and sustainability in December 2012 (Nadia Scialabba, per communication, 15 September, 2012). The involvement of these agencies may further galvanize organic animal husbandry in Asian countries.

IFOAM Asia

On June 1st, 2012, leaders of the organic movements in Asia agreed on the formation of a regional organic alliance in Asia. After a 2-day discussion in the Republic of Korea, 18 leaders of the organic movements in Asia from 13 countries agreed on the formation of a regional organic alliance in Asia. It was decided that the regional body will be under the umbrella of the International Federation of Organic Agriculture Movements (IFOAM) and to be known as "IFOAM Asia". The mission of IFOAM Asia is to nurture and represent the organic movement in Asia in its full diversity. IFOAM Asia will work in synergy alongside Global IFOAM with a common vision to more effectively further the organic movement in Asia. It is a non-profit and membership-based organization, open to all IFOAM affiliates and other stakeholders of Organic Agriculture in Asia. We can expect from this new entity that initiatives on organic animal husbandry would be taken up to give a boost to organic livestock production in these countries.

IFOAM Animal Husbandry Alliance

The IFOAM General Assembly in Korea in October 2011 passed the following recommendation:

Animal husbandry should be given much more emphasis as there are many challenges, such as animal welfare deficits, breeding techniques, animal health, feeding (roughage versus concentrates), etc. There is too much parallel work around the world in the organic sector on animal husbandry, not knowing what the others are doing. The IFOAM World task force should link stronger researchers with standard setters and practitioners. It should link the Standards Committee with researchers trying to further develop organic animal husbandry.
This recommendation has been agreed by The IFOAM-World Board in its April 2012 meeting, which has given green signal to further develop the idea and to implement the recommendation in a suitable way. The IFOAM has launched The IFOAM Animal Husbandry Alliance, during The 2nd IFOAM World Conference on Animal Husbandry held during 12-14 September, 2012 at Hamburg, Germany, wherein the author is the member of core committee. The Asian countries too may actively participate on such global forums so as to develop organic animal husbandry in Asian countries as per the local needs and global realities.

3rd Organic Animal Husbandry Conference in Asia

After successful organization of 1st & 2nd IFOAM animal husbandry conference in USA (2006) & Germany (2012), the third conference is slated to be organized in India in 2015 (http://www.ifoam.org/events/ifoam_conferences/pdfs/Press_Release_2nd_IFOAM_Organic_Animal_Husbandry_Conference.pdf). The organization of this important conference in an Asian country would take organic animal husbandry farther a field.

The way forward

The producers in Asian countries need to overcome the weaknesses and harness the strengths and opportunities, while developing their capacity in terms of knowledge, skills, infrastructure, animal feeding, hygiene, sanitation, disease control and assured certified supply chain required for organic livestock production. Large-scale commercial farms usually undertake most organic livestock production in industrialized countries; whereas, the small scale producers having limited resources and low risk bearing ability dominate Indian livestock sector. Nevertheless, they may cater to domestic consumers, if not exports currently. The emerging need of the quality conscious high end consumers in metros for organic quality animal products is required to be met locally. The local organic milk, meat and egg production may substitute import if any, while generating employment, reducing foreign exchange demand, stimulating innovation, and making the country self-reliant in critical areas like food. Organic livestock production may be encouraged through research & development efforts including establishment of model organic livestock farms, processing units, traceability tools, and capacity building measures, besides consumer awareness on health foods. Consumers need to be told that the safe milk, meat, eggs and products thereof that they are looking for is the one that is ‘certified organic’, while farmers need to be made aware of this demand to enable them to translate it into the new market opportunity!

Optimistically speaking, it is quite possible that good quality organic foods of animal origin would be increasingly available to the consumers in Asian markets and they would attract consumers in other parts of the world, in not so distant future.

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Small Scale Agro-ecological Farming for Local Organic Livestock Food Production System in Thailand

Jintana Indramangala¹, Saranya Kumjudphai² and Manop Kanoksilp³, ¹Thai organic agriculture foundation, ²Surin livestock breeding research center, ³Office of livestock development region 3, Nakornrachsima

ABSTRACT

This paper reports the experience of working with the rural communities on how agro-ecological farming and organic livestock farming can lift up the community capability to sustainably create jobs, increase income, diversify food, improve nutrition, and bring farmers and communities together. The studies were conducted with the organic producer groups in the remote area of Surin province, in the Northeast of Thailand. There were 8 communities and 127 households, who enrolled to be organic livestock producers. They found that self sufficiency starts at a household farming and spreads out to the communities, local area nearby, of which provided greater nutritional diversity. The animal products that contribute to consumers cost 4.47 million baht per year. The average household income from animal produces and products, sold at farmers’ green markets, are 4,000-6,000 baht/month (130-200 US$). Organic deep-bedding swine, free range meat poultry and layer hen are the most products sold at weekly farmers’ markets. It can generate daily and a half-year income and a job opportunity to an unemployed in the villages. Key successes are the strong farmer organization and leadership, institutional collaboration, market access, and farmer to farmer learning system. The agro-ecology gives positive impacts on the community food security; poverty alleviation and climate change mitigation and thus a better quality of life.

Keywords: Small scale farmer, agro-ecology, organic livestock, local food production

INTRODUCTION

Most farmers in Thailand are small scale farmers, with small land tenure, 2-10 acres. The green revolution agriculture associated with a monoculture system has resulted in a significant loss of biodiversity, environmental problems, and a high cost of external inputs. Meanwhile, humans are faced with health hazards through pesticides poisoning, and agrochemical residues in food. Farmers have become indebted as they are not able to pay back loans, which they required to purchase seeds, pesticides and fertilizers. Meanwhile, those farmers could not be self sufficient for food by their own production. Can small scale farmers feed themselves, create employment and contribute to rural development by transition to organic agriculture? How is the best support development of small scale farmers? This is the question to promote the rural development.

Agro-ecological farming can double food production within 10 years, while mitigating climate change and alleviating poverty. Agro-ecology and organic agriculture offer powerful solutions to global hunger, water scarcity, rising fossil fuel-based energy costs and climate change. Furthermore, it creates jobs, increases income, diversifies diet and
improves nutrition, and brings farmers and communities together, these concluded by UN (1). The transition to such agro-ecology farming system and organic agriculture need first to change in mind set. Both farming systems are a natural science, practices and social science behind sustainable agriculture. Organic agriculture is a complex system with connections between organic farming and rural development. It is not just no chemical use, but also involves other factors, such as empowering farmer groups, knowledge management, certifying system, maintaining organic integrity and marketing of their products. This will not happen by chance. It can only happen by design, through strategies and programs backed by strong political will and institution support.

The core principles of agro-ecology include recycling nutrients and energy on the farm, rather than introducing external inputs; integrating crops and livestock; diversifying species and genetic resources in such agro-ecosystems over time and space; and focusing on interactions and productivity across the agricultural system, rather than focusing on individual species. Agro-ecology is highly knowledge-intensive, based on techniques that are not delivered top-down but developed on the basis of farmers’ knowledge and experimentation.(2)

“Organic livestock production” is based on the harmonious relationship between land-plants-animals-humans that emphasizes a proactive health management program that addresses environmental factors to reduce stress and prevent disease, and improve animal welfare and ethical practices. Most organic livestock standards require the use of good quality organic feed, together with regular exercise on pasture and/or open-air runs, to encourage the natural immunological defense of the animal, and ensure an appropriate density of livestock. Most synthetic agro-chemical inputs, antibiotics, synthetic growth promotants and hormones, genetically modified organisms and their derivatives and irradiation are prohibited (3).

Situation of small scale organic farming in Thailand

Thailand is the prominent an agriculture-base country. Agricultural products are diversified and specialized and its exports are very successful internationally. Rice is country’s most important crop, tapioca, rubber, grain, sugar and animal products, fishery products, chicken meat. Anyhow, local farmers have practiced traditional farming for hundreds of years. Such practices have been developed and enriched through farmers’ knowledge of local agro-ecology and environmentally sustainable ways of farming.

Organic farming had been developed with the network of rice farming for many years in order to export to the west countries. Its development has capitalized on the country’s strengths by focusing on organic rice and vegetable production. The majority of organic producers are family farms organized under grower group program or organic projects. The predominant organic agriculture in Thailand is crops, especially rice, vegetables and fruits. A couple of wild products like honey exist. There is growing number of certified aquaculture productions and a few organic livestock. Green Net and Earth Net Foundation estimates the total market for certified organic produces in 2009 at US$ 135.44 million, around half of which is sold domestically and the another half is exported. Currently, there are 3 channels where such products are sold, i.e. supermarket chain, specialized shops, and direct marketing.(4) Organic livestock is new phenomena in Thailand, it had been developed after the declaration of the Thai government in organic movements the year 2006.
Objectives

This paper was reported the success stories of small scale organic crop-livestock farming system at some villages of Surin province, how these can contribute to community development, create jobs, increase income, diversify diet and improve nutrition, and bring farmers and communities together.

Methodology

Case study site

Tupthai village is located at a remote area of Surin province, the Northeast of Thailand. This province is well-known for planting Hom mali rice (jasmine rice). Tupthai is a core village using organic hom mali rice (fragrant rice) as the major way to develop their community. The organic grower group had gradually developed organic rice production for export to EU countries and USA year by year since 2000 under supported by private sector and NGOs and certified by a foreign certification body. These villagers are strong willed in employing organic farming practices and sell their products at a local green market. They are established provincial organic movement supported by many organizations. At the same time, other activities had been developed such as organic vegetables, native fruits and animal products for weekly alternative farmers’ market in downtown.

Institutional supported

The Department of Livestock Development (DLD) has set up extension programs to encourage smallholders to change their backyard animal production system to an organic livestock scheme since 2007. The aims are to boost nutrient cycling, to diversify high quality food production from self contained local economies and to share indigenous knowledge use for complying with organic livestock standards. The challenge is to develop proper programs to increase organic livestock production in order to meet the expansion on the demand side. Such production is a new phenomenon among Thai organic communities, focusing on positive animal health and welfare, good environmental practices to refrain from using synthetic animal drugs, hormones and antibiotics and as a result, to produce high quality food. In contrast, conventional production focuses on reducing cost and maximizing production through faster growth rates and feed conversion efficiency.

The DLD planned extension programs to support grower groups in order to intensify production. The extension services were done by well trained organic advisors. Some of the most important tasks carried out by the advisors have been to facilitate and provide support through the participatory approach to the process of learning. The programs included training courses, field trips and providing some inputs such as breeding stocks.

The development of the organic livestock grower group

For 5 years ago, before introducing organic livestock, these grower group bought manure from other provinces for their paddy fields, until the village leader found that the “swine deep-bedding system” could generate enough compost manure for their farms. They set up a learning process with an academic advisor to learn how to make feed recipes from their own resources. After that meat poultry, layer ducks, and layer hens were introduced in order to diversify their products for household consumption and for local market.
Empowerment of grower group

The DLD located farmers employing best practices in organic livestock production to be role models. Meanwhile, the knowledge management technique was used to link indigenous knowledge with scientific reports, particularly the use of alternative natural products for animal husbandry and health care such as locally produced feed, herbs and effective microorganisms instead of using agro-chemicals inputs. They facilitated these farmers to open their farms and share their experience with interested new comers to organic farming.

Local food movement and organic guarantee system

They were organized and provided organic foods at 4 weekly farmers’ markets in their own village, district, local hospital and city that were called “Green Market”. For organic guarantee system, the grower groups have an experience in organic rice to be certified by foreign certified body. Other organic products from these areas, are not limited to certified organic farms and products, but include all productive agriculture systems that use natural processes, rather than external inputs, to enhance agricultural productivity that meets organic production standards, but do not apply for certification because certification is expensive and requires a sophisticated recording system. Also, their products are directly sold to consumers at the farm gate or in farmer markets.

Otherwise, for organic livestock group establish and implement for inspection and control, as internal control system and Participatory Guarantee System (PGS) (5) that strengthen communities organization under the modified and supervised of the DLD advisors. However these system of quality assurance are still in the beginning step. Otherwise, some consumers wanted to buy their foods from people they knew and trusted with a face.

Data analysing

The data analyzed was done by the organic livestock grower groups. These grower groups consist of 8 villages’ and127 households that were enrolled to be its member. The types of animals were swine, native chicken, layer hen and layer/meat duck.

Outcomes and Impacts

1. Generate income, job opportunities and diversify food

A studies of 8 villages and 127 households, found that the farmers reported self sufficiency starts at farming household and spreading to the communities, local area nearby, which provided greater nutritional diversity. It would say that the farmers had an opportunity to access to the market by their own resources and can generate income.

The animal products that contribute to consumers as shown in table1, its cost 4.47 million baht per year, with average household income from animal produces and products sold at farmers’ green markets were 4,000-6,000 baht/month(130-200US$) and 8,000-15,000 baht/month for all items(260-400 US$).
Swine deep-bedding system was the outstanding livestock production from this village. There were 40 holders who each raised 3-5 swine in their backyard. This system consisted of a confined pen with adequate space of not less than 1.5 m²/head and the essential part of the system was deep-bedding with 90 cm of organic rice-hulls, cow manure, rice bran composted with effective microorganism fermented juice to absorb feces and moisture before slowly composting. The size of farm was 3-5 finishing pigs which is a suitable number in terms of own labor and feedstuffs. Moreover, they encourage the younger generations on the close links to parents’ agriculture, ecology and their food due to they could earn money from selling products at farmers’ market.

Poultry products were the daily income and high protein nutrition for household members. It was suitable for unemployed person such as, the old, women and the young.

**2. Enhanced farmers innovative techniques**

The raising of organic livestock uses a holistic approach for positive animal health. Well adapted pig and poultry from the network were used. The feeding recipes consisted of organic rice bran, broken rice, banana stems, fermented snails/fish juice, and some fresh vegetables mixed together daily. Fermented herbs were added to drinking water, e.g. *Andrographis paniculata, Curcuma longa, Zingiber cassumunar and Tinospora crispa* etc. These herbs have synergistic effects for livestock health, antimicrobial efficacy against poultry and swine pathogens, and enhance feed utilization and immunological effects.

**3. Built the social capital of rural communities**

The grower group had a learning process by sharing traditional knowledge farmer-to-farmer exchange. These village are learning center which they had more than 2,000 key persons visiting a year. The leader of the grower group was the key to the success. She could manage social and participatory processes encouraging the members to work together whilst learning, training in the basics of organic livestock production, forming groups to manage production and an internal control system, post harvest and marketing system.

**4. Fresh, tasty and healthy, local food system**

The best organic food is what’s grown closest to consumers that reduced food miles and shorter supply chain for food, eventually to mitigate climate change. The key success for the growers groups in this case was the opportunity to access direct marketing as long as they were a part of an organic movement organization. Fresh organic markets had been established.
for a period of time by organic producer group networks in Surin provinces. They link trust, norms and interpersonal networks that produce diverse primary products such as rice, vegetables, fruits, mungbeans, and soybeans for local consumers. The livestock products from the case studies, such as duck eggs, pork and native chickens filled a gap in consumer demand for non-factory farming products. The producers can communicate their spirit of organic production directly to customers. Pork from the deep-bedding system was well accepted by consumers due to longer shelf-life, less meat odor, good taste and being tenderer than conventional pork. It could be said that the feeding recipes contained a lot of natural antioxidants from fresh green vegetables and herbs ($\beta$-carotene, vitamin E, $\alpha$-tocopherol).

5. *Nutrient-cycling and ecologically friendly*

Livestock is an integral part of organic farming. The pigs at 5-6 months age had an 80-100 kg finishing weight by feeding from byproducts of their own farm. After finishing the bedding had been completely composted and could be directly applied to paddy fields (4-5 tons per group of 5 pigs). Also the organic rice barn, broken rice and coarse rice hull were use as animal feed and bedding. The farmers said that rather biodiversity in paddy field than conventional field that mean more food such as fish, shrimp, and snail and native vegetables for household consumption.

**CONCLUSIONS**

Lessons learned from this case study were:

1. *Small scale organic livestock production can lift farmers in remote areas out of poverty*, reduce risk and increase food security. The government policy should fully supported along the supply chain of organic agriculture and not overlook the power of small farmers to produce quality foods.
2. *Leadership* is the key success, who was build the strategies trusting relationships throughout the community and must have strong farmers’ organizations
3. *Intuitional supported* from many stake holders, but it is not an easy task to overcome. However, in these areas where conditions favor the adoption of organic agriculture by small scale farmers, the extension service and collaboration to assist in adding organic livestock would be easy to work with the farmers.
4. *Market accesses* are the keys for giving farmers more incentive and motivation to adopt.
5. *Innovation and participatory research* have a must with better defined research questions for various sustainable production systems. It is difficult to establish a one-size-fits-all approach because conditions will vary in different zones.

Anyhow this project are still on growing for improving the quality of life of rural communities and sustaining food productions.
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[www.thaiorganictrade.com](http://www.thaiorganictrade.com), archive 09/2011
ABSTRACT

The study on “Organic Livestock in the Agriculture System in accordance to the “Sufficiency Economy Philosophy : A Case Study of the Farmers in Mae Rim watershed Chiang mai Province.” focused on the food security and environmentally friendly production in order to find the lesson learned from the farmers in Mae Rim River Basin, Chiang Mai. Furthermore, the other objective was to assess the competency in self-reliance as the aspect of factors of production, factors of life, including sustainability in production process and competency in farmers’ adaptation in various situations. For instance, change of weather, emerging trade agreement, economic, social and environmental circumstances.

This study was conducted by the mixed method. It applied the research instrument for community participation, interview, and sampling method for the subject selection of the study. The questionnaire was used to collect the data from 150 farmers in Mae Rim River Basin with the purposive random sampling. Moreover, there were totally 8 cases ; 2 cases from each sub-district: Sob Peung, San Pa Yang, in Mae Tang district , and Salaung, Huay Sai in Mae Rim district, Chiang Mai. Based on the case study selection for the studying the community participation revealed that fifteen years earlier, 83 percent of the farmers fed only a kind of animal for foods , saving money, and manure. They raised cows, buffaloes, chickens and pigs. They used a few of chemical fertilizer because dung could be used cultivate rice and homegrown vegetables. Additionally, the pesticide was used a few since the farmers used the herbicide to feed animals. Presently, only 21 percent of the farmers are raising the livestock with cows, chickens, ducks, and pigs and it is tending to decrease steadily. It also found that 15 years earlier, the framers was self-reliant as the aspect of the factors of production such as rice, vegetables and fruit and self-reliant in food as 55 to 84 percent. The competency in self-reliance as the aspect of foods has decreased to 19-26 percent and has tended to reduce steadily.

Moreover, as the factors of production like manure, animal foods, they rely on themselves from 65 percent to 12 percent. Comparison of the last 15 years and now, the ratio in using the chemical fertilizer, herbicide, and pesticide has increased to 78 percent of the plantation in Mae Rim River basin.

Becoming the debtors of the farmers has risen from 47 percent to 81 percent. Each household has 79,000 baht for their debts increasing from 23,000 baht. Nowadays, the farmers had the low to lowest risk; the sustainability has reduced to 8 from 4 of 10 ratios. Referring to the environment, 12 years of experiences in organic farming in Mae Rim River basin, it could be indicated that the competency in producing soil food has decreased rapidly. The creatures, which play an important role in supporting the growth of rice such as BGA or Azolla. These absorb the nitrogen from the weather and are the food of worms in the rice field. The worms have the duty to serve the nutrition to the root of rice. These activities tend to fall quickly in the production of chemical system and are the
Lower levels in the organic farming. Since various creatures in the rice field need organic food particularly phosphate from dung; therefore. It can be believed that livestock is the other important factors influencing on the production pattern of the farmers. If the farmers raise the livestock along with running the plant activities, the quantity in using chemical will decrease, and then there will have a few impact of production process on environment. And if the farmers raise various livestock, especially poultry, the farmers will have more food security and become the immune from the impact of change in various aspects as well.

INTRODUCTION

Statement of the Problem

Thailand is an agricultural country which the way of life depends on the nature. The nature is the main regional food resource based on the potential of the region combined with the local wisdom learning passed from generation to generation and was the cause of the technological development and the assimilation of the culture with the lifestyle. Therefore, it became to agricultural culture. The first important historical evidence appeared in the first stone inscription of Pho Kun Ramkamhang in B.E.18 describing the prosperity of Thailand with the inscription “The water is full of water and the field has rice” (National Center for Genetic Engineering and Biotechnology, 2001) It showed that Thailand’s land is the land of resources and the land of varied heredity. The most importance is the fact that the prosperity wasn’t from a chemical or any fertilizer (A National Strategic plan for National Organic Farming Development. Issue 1. , 2008) because Thailand has the potentiality and a competitive advantage due to its variation of resources. But the agricultural system of Thailand is the natural system and the local wisdom which has the differences and similarities in each social landscape. The Green Revolution had a direct effect on the world and agricultural systems. Therefore, in 1962, Thai agriculturists changed the production system from the original system which depended on nature and showed respect for the natural regulation to the production which was powerful than the nature and became mono-crop. It depended mainly on external factors emphasizing on trade. Thus, the agriculturists initiated to implement technologies for seed, fertilizer, and herbicide. Although the Green Revolution increased the high production and high profit, it also influenced the environment, and decreased the once varied biology therefore the self reliance of the agriculturists also decreased a lot.

The political policy also weakened the community, for example, when General Prem Tinsulanonda (formal prime minister) announced the urban development policy by mobilizing the government officers taking roles in the community such as agricultural district, developers and bank officers of Bank for Agriculture and Agricultural Operatives including private sectors helping in development. However, it turned out that the government damaged the rural infrastructure. The production for consuming changed for business, production based on their resources became to ask for loan being as the investment for production and surviving. The expectation was to lead to Modernization so it was the mistake of the development. The cultural system of gathering for growing rice and the economy self-reliance system depended on external factors. Therefore, rustics get adversity. Most of them were agriculturists and they were once the back bone of the country, but were destroyed with this national policy. There were 4 weaknesses which were the decrease of self –reliance in production factors, the decrease of self –reliance in daily surviving factors, more debts
causing leaving their homes and working in other places, as the result of it, the agriculturists could not stand by themselves because the agriculturists and the nation were weak, too.

This result was compatible with the study of the process of overcoming the poor villagers in Pang Eka, Chiang Mai conducted Amphawa (2001) which showed that the cause of becoming poor initiated from the development by the government domination in culture. This could simply say that the policies were not set on the social basement but it focused on capitalism, promoted production for trade to serve for the economic growth and the managerial system. The natural resources decreased quickly then; the villagers of Pang Eka were forced to rely on money for purchasing passions. Finally, they were also forced to change their lifestyles, the way they manufactured agricultural production and they began to be in the debt system. In 2000, the total number households in Pang Eka village were 52 families, there were only 4 families to plant enough rice for the whole year and the others lacked rice. In the past, they had had sufficient rice for consuming.

Comparing to the organic farming production in Thailand where had the proportion of organic farming only 0.7 percentage of the overall production. When Thailand compared with the other countries such Sweden, where had 11 percentage of organic farming from overall production in 2005 and focused on increasing of 30 percentages in 2010. In Japan, there were 32 percentages of agriculturists who did non-chemical farming and planting including organic farming and Switzerland had the increase of agriculturist who did the organic farming at 9.2 percentages of all agriculturists. In the EU had the organic farming production of 23 percentage of the total organic farming area around the world (Department of Export Promotion, 2010). The high percentage indicated that the agriculturists concerned more on the hazard of chemical production affect to the health of manufacturers including environment. Moreover, the market growth rate which increased 11 percentages annually and expect to grown to 54 percentages in 2012 had an impact on rapid expansion (Food Association, 2008). However, the increase if organic farming area in Thailand has still been slowly and some year, the trend seemed to decrease, for example, the year of 2007, the farming area decreased 14.3 percentages. The decrease was caused from the agricultural pricing policy and fluctuation in weather condition, so it has a challenged question for the organic farming supporters how organic farming is the solution of sustainability of agriculture.

Mae Rim watershed is the first area for promoting organic farming in Thailand. Based on the survey by the researcher in 2010 found that there was 150 families of farmers who have participated in “The Organic Farming Project” and the other strong groups of organic farming such as Bann Don Jiang group, Ban San Yang group, Ban Na Huk group, etc. These groups have mainly produced the organic rice; the second group of products is soybean, vegetables, and fruits. They did integrated farming and the production activities have changed to organic farming since 1994. The change begun from San Pa Yang Organic Farming group, Sob Peung Organic Farming Group, and Sa Luang Organic Farming Group. Although the promotion of organic farming has done for many years, the adjustment of production model to the organic farming production has still been slowly. If the organic farming is the solution of being sufficient for the agriculturists, the solution of sustainability might be whatever model in integrating the production of organic farming with the sufficiency lives.
Purposes of the study

1. To study the personal basic information regarding economic, societal, and environmental aspects of organic farming agriculturists in Chiang Mai
2. To examine organic farming production system as the resources management, and farm organization of the agriculturists in Mae Rim watershed, in Chiang Mai
3. To investigate the factors contributing to pattern of chemical to organic farming as well as the adjustment process of the target agriculturists
4. To study the correlation of Sufficiency Economy production practice within a Sufficiency Economy lifestyle

Limitations of the Study

Limitation of this study include only agriculturists who do organic farming in the area of Mae Rim watershed Chiang mai Province. They are also the members of the Center for Study and Development of Organic Farming, Rainbow Farm, Organic Farming Cooperative Chiang Mai, Agricultural Development Cooperative Co., and Sustainable Agricultural Community Institution. The researcher selected them from these organizations because they have worked in promoting organic farming in the area for a long time and are reliable enough so that comprehensive information on issues will be covered. 150 members were selected from 14 villages in 4 districts, Huay Sai, Saluang, Sop Peung, San Pa Yang, Mae Tang districts. They were separated into 3 groups: over 3 years of agricultural experienced in organic farming, less than 3 years of agricultural experiences in organic farming, and some agriculturists who had quit organic farming.

Literature Review

In Thailand, the road map mentioned above became the lesson learned for big agricultural companies which are processing on the policy of business in controlling national food chain system as well as having the concept to coordinate the food chain system with the multinational companies. Rice is the target of those companies and rice is important for the nation. Rice is not only the staple but also is cultural and social symbol of Thailand. Therefore, many companies are trying to improve rice varieties and acquire the rice companies.

Agriculturists are the manufacturers of food, clothes, housing and medicine. Considering what is mentioned above, we will see that the agriculturists are the basement structure of the nation. If the agriculturists cannot create a foundation strong enough to hold up themselves and their families, we might face an economic crisis again. The important thing is for the agriculturists to be strong and to be firm for risks. The agriculturists will be strong if they rely on less external factors. Additionally, they learn to take advantages of what they have, and not to exploit themselves and others or the environment. Thus, organic farming is one alternative for agriculturists.

The definition and the importance of organic farming

Organic farming means not only the agricultural production system but also has the deep meaning on the independence of the earth, food sovereignty, the concern of the consumers and agricultural environment. Capra (2005) mentioned that planting only single vegetation is bad for food stability. Applying technologies with agriculture seems to destroy the soil, increase inequity in society including destroying the ecological balance in nature.
One solution for agriculturists in the world of farming is called “Quiet Evolution” and the choice of nature is known under various names such as Organic Farming, or Sustainable Agriculture. In addition, organic farming is an alternative for sustaining the ecological cycles. As the process which caused the evolution of the elements in the system, organic farming is the way to increase the amount of carbon in the soil, so it can help to solve global warming. Capra (cited in Amory, 2005: 255) said that the increasing of carbon in the soil can absorb the carbon which humans release it. In addition, Evan (2006) wrote on “A Hand to the Plough” about organic farming which is compatible with Capra’s message (2005) stating that it is not only a production system of agriculture but also the deeper meaning of soil sovereignty in production and the concern on agriculturists and consumers’ health and the environment. Raynold (2000) also mentioned that avoiding the chemical fertilizer and genetic plants is the main factor in organic farming production which leads us to the clear vision of farming with nature, in order to reduce the external factors. Mookda (2002) also agreed that organic farming is the solution and the answer for the sustainability of agriculture system. The answer is called by various names such as the sustainable agriculture system, organic farming system and natural agriculture system. No matter what it is called, the meaning and the importance of the agriculture pattern creates agriculture sustainability within a society.

Furthermore, the resolution of the general meeting of the International Confederation of Agriculture or IFOAM in June of 2008 in Italy concluded that “the production system that focuses on sustainability of soil, ecosystem, and people. The organic farming relies on ecological processes, biodiversity and natural cycle which have the specific characteristic of each area instead of utilizing the production factor which has negative impact. The organic farming blends of local knowledge, innovation, and scientific knowledge in environmental conservation and promote fair relationships, the good quality of all people and related living things.”

Therefore, the organic farming is not only doing agriculture for the environment but also doing it for agriculturists’ freedom as well as creating food stability and immunization for agriculturists. Most importantly, organic farming creates fairness and conserves the local wisdom as a base of appropriated technology development.

As the literature review, it showed that the organic farming plays an important role and it is one hope for Thai society since the key of organic farming is as self-reliance, simplicity and seclusion including the local wisdom as the base for production. This production is consistent with the “Sufficiency Economy” philosophy of the King.

**State of organic farming at Mae Rim Watershed**

Chiang Mai is a place where organic farming is done Thailand. It was started around 1992, especially in Mae Rim, Amphoe. Mae Tang and Amphoe. Doi Saket. Most products were rice, soy beans, and vegetables (Kasikorn Center Research Institution, 2007) , it found that the area of Mae Rim basin is important for mainly doing organic farming in Chiang Mai since Mae rim river is the major branch of Ping river’s beginning. The Mae Rim River has an area of approximately 596.36 square kilometers. The water source is from two stream; the first upstream falls from the peak in Tambon. Saluang, Amphoe. Mae Rim and the second stream is from the peak in Tambon, Pa Pae, Amphoe.Mae Tang. The streams flow and join at Ban Kad How, then Tambon. Saluang, huay Sai, and flow into the right bank of Ping River, Tambon. Rim Tai, Amphoe. Mae Rim has the length of 41 kilometers. Moreover, the study also revealed the fact that organic farming has been ongoing for a long time. Additionally, to support this idea, there are many studies done by the researchers as follows:
Jintana et al. (2009) did researched organic duck farming in Amphoe. Mae Rim, Mae Tang and Doi Saket. The results showed that the agriculturists faced with the success in organic duck farming due to organic duck farming participation of agriculturists who have been joining organic rice farming for a long time and the integration of organic livestock farming.

The potential of agriculturists means rational, agricultural production with an emphasis on diversity and complementary with regard to the ecosystem and consumers health. With organic farming, the production is not the important goal but rather the environment and the value of production. In order to choose what activities in agriculture, the agriculturists have to use their knowledge and use their wisdom in choosing production activities to support each other. Surely, the agriculturists who want to do organic farming successfully requires morality, especially diligence, honesty and patience. It is important to fight to overcome their greed in the midst of running their farming.

The Thai Junior Encyclopedia Project commented that Sufficiency Economy is cultural and moral with no focus on greed. Each means life is dependent on nature and the main goal of the sufficiency economy with four factors of security, along with the sustainability of the ecosystem. The push will be successful if the people think nationally and globally, because the world is obsessed with thoughts of globalization, and capitalism as opposed to the culture of sufficiency economy.

Sufficiency Economy is not only a philosophy but it is a theory of living with peace, and happiness in the society. It is not just a theory aimed at explaining the phenomenon. It is the best practice in the context of the Buddhist way of life. In addition, under the framework of a sufficiency economy, his Majesty the King gave the speech of how to spend life and work as the agriculturists with the name of "New Theory."

Thipthongpha (2007) pointed out that Sufficiency Economy does not focus solely on agriculture but extends to life, operation of the business sector, trade or even of politics focusing on being dependent, and self-sufficient without encroachment.

Tawan and Chirawut (2009) studied on "Sufficiency Economy: A Case Study of the ducks in the paddy fields of organic farming in Chiang Mai. It found that increasing the diversity of production activities of farmers, especially for the organic rice grower will encourage the agriculturists to have the ability to be self-reliant in food, and production factors such as manure, and shellfish elimination. In addition, it provides the to effective resource management for land and labor, etc.

Decha (1989) stated that self-reliance processes starts from the spiritual process, thinking of self-reliance by decreasing the dependence on external factors in life, production process, consumption aimed at taking advantages of existence resources and sustainability.

**Approach and Methods**

This study aims to conduct the research as the qualitative research focusing on investigation by inductive approach, seeking for the conclusion and the hypothesis based on the data collected, and then concluded or describing the theory (Grounded Theory). The instruments are in depth interview, participant observation, focus group discussion, the study of lifestyle history plus production systems in farms with drawing plans of farms. In order to design research to obtain data that can predict the behavior of everyday life and the
combination of occupations with different beliefs, have accurate data and prevent the failure of key issues, it is essential that the researchers will collect the data and analyze the data at the same time which is consistent with the following proposal;

Creswell (2008) discussed the main characteristics of the study with the foundation of Grounded theory which depends on setting the assumptions and analyzing the data at the same time as data collection. This means that researchers will not wait until finishing data collection to then analyze the data. In practice, researchers are looking for the concept of useful information in framing the study of phenomena. Researchers can make assumptions from those concepts. The hypothesis is set up by empirical data analysis, then is tested with the new information. New data means be adjusted the hypothesis undergoes several adjustments until reaching the saturation in terms of information, concepts and theories. After that, the researchers will stop collecting data and conclude with a summary or explanation oriented theory with the issue studied.

Therefore, the researchers have determined the research approach based on the objectives to study and answer the research questions contributing to the Sufficiency Economy approach of adjustment of the paradigm, and the process of behavior production in the organic farming the process of adjustment as well as factors affecting paradigm adjustment for life in sufficiency economy of the agriculturists and the process of it, and the indicators in measuring the sufficiency life of the agriculturists.

**Population**

Therefore, the researcher selected the subjects among the agriculturists who do organic farming in the area of Mae Rim watershed and river branches. They are also the members of the Center for Study and Development of Organic Farming, Rainbow Farm, Organic Farming Cooperative Chiang Mai, Agricultural Development Cooperative Co., and Sustainable Agricultural Community Institution. The researcher selected them from these organizations because they have worked in promoting organic farming in the area for a long time and are reliable enough so that comprehensive information on issues will be covered. 150 members were selected from 14 villages in 4 districts, Huay Sai, Saluang, Sop Peung, San Pa Yang, Mae Tang districts. They were separated into 3 groups: over 3 years of agricultural experienced in organic farming, less than 3 years of agricultural experiences in organic farming, and some agriculturists who had quit organic farming.

**Data Collection Procedures**

This research is the study among the agriculturists who are the members of Rainbow Farm, Organic Farming Cooperative Chiang Mai, Agricultural Development Cooperative Co., and Sustainable Agricultural Community Institution which works collaboratively. The researcher has planned to collect the data as follows;

1. Set appointment with the agriculturists by telephone in order to find the appropriated date to interview and observe
2. Set the agriculturists into 14 groups according to their villages which are the village of Don Kiang, San Pa Teung, Na Huk, San Pa Yang, Tong Mai Sahakorn, Sop Peung, Ta Kam, Nong Kai, Salung, Kad How, Som Sook, Meung Ka, Huay Sia, and Hua Fai

The data will be collected from the subjects in all groups by interview, and participant observation. The researcher takes part in the observation since the researcher also does
activities with them for a while until are accepted by them. As a result, the researcher can interpret the behavior by observing, questioning, and recording (Nongpun, 2003) or tape recording as well as taking photos (Marshall and Rossman, 1999). Therefore, the data will be effective and can be easily to be participating in and analyze the data at the same time.

1. Interpret data and create the paradigm with the technique by setting the various Codes. Then, the data is categorized into group for setting the assumption.
2. Select the agriculturist to participate in doing activities and create the theoretical concept based on “Grounded Theory”. Set them into 3.
3. Apply the concept and assumption from data collection of phrase 1, then give to the subjects 10 days in advance
4. Collect data for phrase 2 from each group of subjects based item 4 with the focus group discussion. After that, the data will be analyzed and the assumption will be proved based on the assumption from item 4
5. Conclude the data from item 6, then set the assumption for the theoretical description as the empirical data. In case of the conclusion is not accurate, it is necessary to have various discussions until it finalizes.
6. Random the agriculturists representative as item 4 for the second phrase, then give to the subjects 10 days in advance
7. Collect the data for the second round from 3 groups with the focus group discussion for analyzing and test the assumption and adjust it
8. Write a conclusion as the theoretical description as the result of doing organic farming towards the life of sufficiency
9. Final check to prove the paradigm and the description of assumption for the accuracy. The researcher invites the representative of agriculturists to have the discussion for collaborative analysis.
10. Stop collect the data when the researcher obtains the saturation both of data, paradigm and theory. Then, the conclusion and theoretical description are done.
11. Write a report as the framework for organic farming of the agriculturists in Mae Rim watershed, Chiang Mai

**Data Analysis**

The data analysis of the quantitative data is varied and different since it does not have the exact rules; therefore it is the researcher’s responsibility in this field. The researcher has to have the broad and in depth knowledge and also a high ethic, so that the effectiveness and quality of the data analysis depend on the capability and the researcher’s experiences (Patton, 1990). However, the researcher will analyze the data based on lifestyle of Sufficiency Economy and theoretical sensitivity.

**RESULTS AND DISCUSSION**

The study on “Organic Livestock in the Agriculture System in accordance to the “Sufficiency Economy Philosophy: A Case Study of the Farmers in Mae Rim watershed Chiang mai Province.” focused on the food security and environmentally friendly production in order to find the lesson learned from the farmers in Mae Rim River Basin, Chiang Mai. Furthermore, the other objective was to assess the competency in self-reliance as the aspect of factors of production, factors of life, including sustainability in production process and competency in farmers’ adaptation in various situations. For instance, change of weather, emerging trade agreement, economic, social and environmental circumstances.
This study was conducted by the mixed method. It applied the research instrument for community participation, interview, and sampling method for the subject selection of the study. The questionnaire was used to collect the data from 150 farmers in Mae Rim River Basin with the purposive random sampling. Moreover, there were totally 8 cases; 2 cases from each sub-district: Sob Peung, San Pa Yang, in Mae Tang district, and Salaung, Huay Sai in Mae Rim district, Chiang Mai.

To study an education process collaboratively, it has found that economic, society, and environment of agriculturists in organic agriculture system in Mae Rim river basins, the data from interviewing agriculturists in Mae Rim river basins, most of them are minors, having plantation in average of 4.5 Rai, the age of 52 years old, the education mostly in 4th grade, an average annual income of 204,543 Bht per family, expenses about 179,050 Bht, average debts at 79,000 Bht, most of cultivation are rice, soybean, corn, and vegetable respectively. Livestock’s activity has been excessively changed from the past, there are less doing livestock and cultivation together. But it is still found feeding local chicken, ducks, cows, pigs, all in small amount comparing to the needs in local area.

Geosocially, the geography is range of hills and lowland, most of cultivation depends on country’s geography, also Maerim river basins are various races which became an indicated factors on technology and process in agriculture.

From the study of self-reliance system and food security, 15 years earlier, the farmers was self-reliant as the aspect of the factors of production such as rice, vegetables and fruit and self-reliant in food as 55 to 84 percent. The competency in self-reliance as the aspect of foods has decreased to 19-26 percent and has tended to reduce steadily. Moreover, the capability of reliance in production factors such as fertilizers and pet food decrease in 12% from 65%. Last 15 years, the ratio of using agricultural chemical especially chemical fertilizers. Herbicides and pesticides have been increasing to 78% of entire agricultural area on Maerim River basins.

Becoming the debtors of the farmers has risen from 47 percent to 81 percent. Each household has 79,000 baht for their debts increasing from 23,000 baht. Nowadays, the farmers had the low to lowest risk; the sustainability has reduced to 8 from 4 of 10 ratios.

From the study about capability in adaptation and environmentally friendly production in order to find the lesson learned from the farmers in Mae Rim River Basin, Chiang Mai, also estimate the capability of self-reliance in production factors, living factors altogether with the sustainability in and competency in farmers’ adaptation in various situations. For instance, change of weather, emerging trade agreement, economic, social and environmental circumstances. It has found that fifteen years earlier, 83 percent of the farmers fed only a kind of animal for foods, saving money, and manure. They raised cows, buffaloes, chickens and pigs. They used a few of chemical fertilizer because dung could be used cultivate rice and homegrown vegetables. Additionally, the pesticide was used a few since the farmers used the herbicide to feed animals. Presently, only 21 percent of the farmers are raising the livestock with cows, chickens, ducks, and pigs and it is tending to decrease steadily.

From the study about evolution in adaptation in suitable technology, the production in an organic farm system which studied from the process of production of agriculturists, has found 2 wisdoms which are the wisdom from conservative agriculturists and progressive agriculturists. This explains the phenomenon of agriculture social with social changing theory.
by August Comte who believes the society must have 2 important structures which are social statics and social dynamics.

Referring to the environment, 12 years of experiences in organic farming in Mae Rim River basin, it could be indicated that the competency in producing soil food has decreased rapidly. The creatures, which play an important role in supporting the growth of rice such as BGA or Azolla. These absorb the nitrogen from the weather and are the food of worms in the rice field. The worms have the duty to serve the nutrition to the root of rice. These activities tend to fall quickly in the production of chemical system and are the lower levels in the organic farming. Since various creatures in the rice field need organic food particularly phosphate from dung.

**CONCLUSIONS**

Therefore, it can be believed that livestock is the other important factors influencing on the production pattern of the farmers. If the farmers raise the livestock along with running the plant activities, the quantity in using chemical will decrease, and then there will have a few impact of production process on environment. And if the farmers raise various livestock, especially poultry, the farmers will have more food security and become the immune from the impact of change in various aspects as well.

**REFERENCES**


LowInputBreeds: research to improve health and performance in European organic and low-input livestock

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SUMMARY

The LowInputBreeds project aims to develop integrated livestock breeding and management strategies to improve animal health, product quality and performance in European organic and low-input milk, meat and egg production through research, dissemination and training activities.

PROBLEM

Almost without exception, breeding goals in livestock production in recent years have been dominated by the demands of intensive systems striving for higher yields. As a result of progress in animal breeding, today’s dairy cows, pigs and poultry especially are capable of high outputs but only if supported by high nutritional and veterinary inputs. Under organic or low-input management product quality, health, welfare and fertility deteriorate with modern genotypes. Unfortunately, reduced input systems are in the minority and do not justify sufficient demand by breeding companies to address their needs. They either attempt to minimise the negative impact on high-demand animals or are using traditional unimproved breeds — neither of which is ideal.

BACKGROUND AND OBJECTIVES

It is increasingly recognised that breeding priorities differ between high and low-input systems and the latter tend to be neglected. Recent studies (e.g. the EU FP6 Integrated Project QualityLowInputFood (http://www.qlif.org)) found that livestock breeds (and breeding systems) developed for high-input conventional production lack, specifically:

(i) ‘robustness’ traits required for optimum performance in organic and low-input (e.g. extensive outdoor grazing and free-range) production systems; and

(ii) product quality traits (including nutritional, sensory and animal welfare related quality parameters) that are demanded from the organic and low-input sector.

However, very little R & D has covered breeding concepts, methods and programmes focused on the needs of organic and other low-input systems.

The LowInputBreeds project will focus on developing:

(i) ‘robustness’ (e.g. resistance to biotic and abiotic stress factors, survival of young animals, longevity, fertility);

(ii) ‘product quality’ traits (including ethical qualities related to animal welfare and environmental impact related traits) that have a higher priority in organic/low-input compared to highinput conventional systems.
The project has four main science and technology objectives.

1. Develop and evaluate innovative breeding concepts for five livestock production systems (dairy cows, dairy and meat sheep, pigs and laying hens) and design species-specific breeding strategies for different macroclimatic regions in Europe.

2. Integrate the use of improved genotypes with innovative management approaches including improved diets, feeding regimes and rearing systems. This will focus on issues (e.g. mastitis and parasite control, animal welfare problems) where breeding or management innovations alone are unlikely to provide satisfactory solutions.

3. Identify potential economic, environmental, genetic diversity/plasticity and ethical impacts of project deliverables to ensure they conform to different societal priorities and consumer demands/ expectations and are acceptable to producers.

4. Establish an efficient training and dissemination programme aimed at rapid exploitation and application of project deliverables by the organic and low-input livestock industry.

**METHODODOLOGY**

The project covers six major livestock production systems (dairy cows, beef, dairy and meat sheep, pigs and laying hens). Each of the four species is the focus of individual sub-projects (SPs 1–4) which are further divided into work relating to (a) animal breeding approaches and (b) complementary husbandry necessary to achieve the project goals in situations where breeding alone will not suffice. A fifth work package considers the environmental and economic impact of innovation generated in these technical studies along with the dissemination of findings and training early years’ researchers in some of the techniques being employed.

SP 1 addresses major problems identified for organic and low-input DAIRY COWS: mastitis, poor fertility, milk quality and the environmental impacts of organic and low-input systems. There are three work packages as follows.

Developing within breed selection to improve animal health, product quality and performance traits; comparing genomewide and traditional quantitative-genetic selection

Cross-breeding strategies to optimise the balance between robustness and performance traits; comparing cross-breeds with pure-bred Holstein Friesian genotypes

Design of optimised breeding and management systems for different macroclimatic regions of Europe; model-based multicriteria evaluation with respect to performance, animal health and welfare, product quality and environmental impact

SP 2 aims to improve the performance, animal health and welfare, and product quality in organic and low-input MILK and MEAT SHEEP production, focusing on sheep breeding in Mediterranean or Alpine mountainous conditions. The main issues addressed are the animals’ ability to overcome abiotic (extremes in temperatures and poorly balanced diets) and biotic (internal parasites and mastitis challenges) stress and maintaining milk and meat quality. Work will be carried out in the following work packages.
Developing within breed selection to improve abiotic and biotic stress resistance and performance traits; comparing marker assisted and traditional quantitative-genetic selection systems for functional traits

Improved endoparasite management strategies based on integrating: a) feed supplementation with tannin-rich forages; with b) strategic use of clean pastures; and/or c) the use of parasite-tolerant breeds.

Strategies to improve lamb meat quality based on optimising; a) tannin-rich feed supplements; b) grazing regimes; and/or c) the use of stress-tolerant breeds.

SP 3 on PIGS considers piglet survival in outdoor, organic and free-range production traits, tolerance of abiotic stress (particularly heat stress) and maintaining quality in pig meat. This will be carried out in three work packages.

Developing a ‘flower’ breeding system to improve pig survival and robustness related traits in small populations; comparing the performance of breeds from ‘flower’ and conventional breeding systems.

Management innovations (gilt rearing and lactation systems) on mothering ability as well as pre- and post-weaning diarrhoea and loss of piglets.

Effect of traditional, improved and standard hybrid pig genotypes and feeding regimes on carcass, meat and fat quality in heavy pigs used for premium, regional pork products.

SP 4 on LAYING HENS addresses animal behaviour problems (e.g. feather pecking, smothering, nesting behaviour and associated mortality rates), diseases and parasites, ethical questions relating to male chick and old hen disposal and egg quality, with work carried out in three work packages.

Developing a ‘farmer participatory’ breeding systems to improve productivity, health and welfare and egg quality related traits; comparing standard with farmer participatory breeding systems.

Effect of, and interactions between genotypes, feeding regimes, ‘welfare-friendly’ moulting protocols and prolonged use of layers on performance, animal health and welfare.

Effect of, and interaction between, laying hen genotypes and management innovations on egg quality.

**Main findings and outcomes (results) or expected results**

At the time of writing work is in progress and most studies are on-going with few findings ready for publication. Some provisional findings, however, are available.

Dairy cows

Although the accuracy of genomic selection is greater for high heritability traits such as milk yield, the expected benefits, in terms of relative gains in accuracy of estimated
breeding values, are likely to be greater for traits of low heritability such as those related to fertility.

The addition of Bronopol preservative to milk has little impact on fatty acid determination meaning that routine milk recording samples could potentially be used to identify cows showing superior fatty acid profiles.

Sheep

Sainfoin was effective in parasite control in pre-lambing ewes, reducing the faecal egg output by about 70% compared to forage without tannins. However, this effect was transient, disappearing within two weeks after the end of feeding. Tannin-rich concentrates fed at this time were not effective at reducing egg output.

The timing of pasture access for lambs in Sicily was found to influence meat quality: lambs restricted to grazing during the mornings only were found to have higher levels of indole in carcass fat compared to those with access to pasture in the afternoons or throughout the day, and the latter had a healthier fatty acid profile compared to housed lambs or those with restricted access to grazing.

Pigs

Sow productivity and carcass quality of traditional breeds appear unsuitable for the commodity pork market; however, for niche markets, meat quality of these breeds adds value. Additionally, the dark skin of many traditional breeds offers greater resistance to sunburn and might be an advantage in hotter climates.

Heat stress tolerance can be measured by reproductive performance identified in a large data sets (100,000 records) collected on farms in Spain and Portugal. For farrowing rate, heat stress heritability ranges from 0.02 to 0.05.

Laying hens

Farmer workshops in the Netherlands and Switzerland identified an ‘ideal hen’ for low-input systems with lower peak production and higher eating capacity, relative to modern hybrids, and also showing an absence of smothering behaviour and feather pecking: many participants described the ideal hen mentality as ‘optimistic’, ‘not stupid’, ‘bold and assertive’.

A data set of 276 free-range and organic poultry units in France, the Netherlands and Switzerland shows a wide range of genotypes used with clear differences in flock and farm size and housing system between the three countries. Production was similar, except for organic flocks in the Netherlands which had lower egg production and higher mortality. Across countries and production systems, white hens and mixed flocks (in Switzerland) perform relatively well in contrast to silver hens that showed higher mortality and more poorly feathered birds.

POTENTIAL APPLICATIONS

The success of the LowInputBreeds project will help to reduce production problems and improve animal health and welfare in European organic and low-input production systems, while improving the quality of milk, meat and eggs for consumers. Many findings...
could also be of benefit to livestock systems currently relying on high inputs. As pressure on prices for feed, fertiliser and other resources increase on the world stage, many of these intensive units tending to question high inputs.

**PROGRESS**

Findings from the LowInputBreeds will be in the public domain – with the aim of all ‘final reports’ appearing as peer reviewed publications. Progress to this end can be followed on the website (www.lowinputbreeds.org) as can interim reports in our bi-annual Newsletters. The website also has direct links to a wealth of information in an open access archive for papers related to research in organic agriculture - organic eprints (http://orgprints.org/)

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Conventional Dairy Farming
- Caged raised calves
- Confined herd, no grazing room
- Cows fed mostly concentrates
- Antibiotics used

Organic Dairy Farming
- Free-ranging calves
- Pasture-raised herd, sufficient grazing room
- Grain-based diet
- Diet supplemented primarily by plant matter, growth-promoting, no chemical fertilizers used

Lumbong Farm
- Ms. Rachawut

Lumbong Farm
Proceeding of the 15th AAAP Animal Science Congress
Symposium 1,3,7

Standard Pricing for Raw Organic Milk

<table>
<thead>
<tr>
<th>Grade</th>
<th>Methylene Blue</th>
<th>% Fat</th>
<th>% SNF</th>
<th>Somatic Cell (cell/ml)</th>
<th>TPC (cell/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &gt; 60 Bit</td>
<td>&gt; 4 hrs. (Grade 1)</td>
<td>&gt; 6.3</td>
<td>&gt; 8.35</td>
<td>≤ 200,000</td>
<td>≤ 100,000</td>
</tr>
<tr>
<td>B &gt; 40 Bit</td>
<td>4.5 hrs. (Grade 2)</td>
<td>5.7 – 3.9</td>
<td>8.26 – 6.30</td>
<td>200,000 – 400,000</td>
<td>100,000 – 200,000</td>
</tr>
<tr>
<td>C Standard Price 20 Bit</td>
<td>4.5 hrs. (Grade 3)</td>
<td>4.1 – 1.6</td>
<td>6.01 – 4.25</td>
<td>400,000 – 600,000</td>
<td>200,000 – 300,000</td>
</tr>
<tr>
<td>D &gt; 20 Bit</td>
<td>4.5 hrs. (Grade 4)</td>
<td>1.5 – 3.1</td>
<td>7.50 – 4.00</td>
<td>600,000 – 800,000</td>
<td>400,000 – 600,000</td>
</tr>
<tr>
<td>E &gt; 2 Bit</td>
<td>≤ 4 hrs. (Grade 5)</td>
<td>≤ 3.0</td>
<td>≤ 7.75</td>
<td>&gt; 800,000</td>
<td>&gt; 600,000</td>
</tr>
</tbody>
</table>

Minimum Price 100/ltr. kg.; Maximum Price 220/ltr. kg.

Lumbong Farm Milk Quality

<table>
<thead>
<tr>
<th>List</th>
<th>Spec.</th>
<th>Lumbong Farm</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylene Blue</td>
<td>≥ 4 hrs. (Grade 1)</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>% Fat (Gerber Method)</td>
<td>≥ 3.3 %</td>
<td>4.1</td>
<td>A</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.025 – 1.015</td>
<td>1.012</td>
<td>1.012</td>
</tr>
<tr>
<td>% SNF</td>
<td>≥ 8.25 %</td>
<td>9.19</td>
<td>A</td>
</tr>
<tr>
<td>% Lactose</td>
<td>≥ 3.8 %</td>
<td>4.88</td>
<td>4.88</td>
</tr>
<tr>
<td>% Protein</td>
<td>≥ 3.0 %</td>
<td>4.03</td>
<td>4.03</td>
</tr>
<tr>
<td>% Sec</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>pH</td>
<td>6.6 – 6.9</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Somatic Cell (cell/ml)</td>
<td>≤ 400,000</td>
<td>200,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Total Plate Count</td>
<td>≤ 600,000 cell/ml</td>
<td>155,633</td>
<td>155,633</td>
</tr>
</tbody>
</table>

Comparing Organic and Conventional Raw Milk

<table>
<thead>
<tr>
<th>List</th>
<th>Spec.</th>
<th>Organic</th>
<th>Non-Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylene Blue</td>
<td>≥ 4 hrs. (Grade 1)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>% Fat (Gerber Method)</td>
<td>≥ 3.3 %</td>
<td>4.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.025 – 1.015</td>
<td>1.012</td>
<td>1.013</td>
</tr>
<tr>
<td>% SNF</td>
<td>≥ 8.25 %</td>
<td>9.19</td>
<td>8.88</td>
</tr>
<tr>
<td>% Lactose</td>
<td>≥ 3.8 %</td>
<td>4.88</td>
<td>4.71</td>
</tr>
<tr>
<td>% Protein</td>
<td>≥ 3.0 %</td>
<td>4.03</td>
<td>3.11</td>
</tr>
<tr>
<td>% Sec</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>pH</td>
<td>6.6 – 6.9</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Somatic Cell (cell/ml)</td>
<td>≤ 400,000</td>
<td>200,000</td>
<td>720,000</td>
</tr>
<tr>
<td>Total Plate Count</td>
<td>≤ 600,000 cell/ml</td>
<td>155,633</td>
<td>452,800</td>
</tr>
</tbody>
</table>

Transitioning to Organic Dairy Production
From Birth to Bottle:
The Organic Dairy Journey

1. Calf born on organic farm
2. Heifer raised according to organic standards
3. Pregnancy
4. Milk delivered to processor (Dairy Home)
5. Organic raw milk
6. Cow joins producing herd (9 months)
7. Certified organic dairy products

Farms in the Dairy Home Network
- Harkuk Farms
- Rusa Farms
- SK Farms
- Thung Phu Farms
- Pueng Fon Farms
- Thung Phu Farms

Amporn Farm
Lambing Farm
Matani Farm
Surina Farm
Sub Sann Farm

Pilot Programs on the Farm
Herb Fermentation Demonstration – 18th August 2010

In-Farm Medicinal Herb Garden Initiative

Amporn Farm
Pueng Fon Farm

Planting commenced 11th May 2012
Planting commenced 16th May 2012
Proceeding of the 15th AAAP Animal Science Congress
Symposium 1,3,7

Fever Reducing, Anti Inflammatory
นกขัวใบไม้ ต้มแก่นกพริก
Baker's weed
Eupatorium odoratum L.

Anti Inflammatory Herbs
กลุมมุ้นไพรนอมทอง
Bitter bush
Eupatorium odoratum L.

Nutritional Herbs
กลุ่มมุ้นไพรนอมทอง
Baker's weed
Eupatorium odoratum L.

Insects Repellent Herbs
กลุมมุ้นไพรนอมทอง
Baker's weed
Eupatorium odoratum L.

Anti Inflammatory Herbs
กลุ่มมุ้นไพรนอมทอง
Baker's weed
Eupatorium odoratum L.

Pasteurization Process

New milk delivered and weighed

Storage
Pasteurization
Yogurt Production

1. Jars or preservatives added to the bottom of containers
2. Containers are sterilized
3. Containers await filling
4. Culture added to pasteurized milk
5. Yogurt left to ferment
6. Containers sealed
7. Finished products are refrigerated
8. ... and delivered
Transition to Certified Organic Dairy Farming for Small Farmer: a Case Study of the Dairy Farming Promotion Organization of Thailand

Chockchai Chaimongkol
Dairy Farming Promotion Organization of Thailand (D.P.O.), Muaklek, Saraburi, Thailand

ABSTRACT

The Dairy Farming Promotion Organization of Thailand (D.P.O.) has interested in organic dairy production system and setting an organic dairy farm in order to develop appropriate management practices and demonstrate them to the dairy farmers for their successful and sustainable of the organic dairy farming in Thailand. This organic dairy farm was begun in June 2007, managed separately from the Thai-Danish conventional dairy farm, and achieved organic dairy certification in June, 2011. During the first two years of transition period, the main activities were collection the information from all practices and brought them for discussion with advisors in organic dairy farming, feeding management, and production systems. In June, 2011, the D.P.O organic farm had 43 cows, 27 of them were milking cows and the others 16 were dry cows. Currently, the average dairy milk production of the herd is 260 kg (9.8 kg of milk per cow), and the selling price is 25 baht per kg, however the average milk production cost is 23.95 baht per kg. Organic Best Management Practices (OBMP) from all experiences and knowledge getting from managing this D.P.O. organic farm were used to support newly transitioned organic dairy farmers and those farmers who are considering making their decision on organic dairy farming. The management practices emphasize on feed supplement plan by producing high quality forages and crops along with improving quality and well-managed grazing pasture. To sustain milk production, milking cows should receive high quality feeds to meet their nutritional requirements for maintaining good body condition and giving consistently milk yield. The major problem in managing this farm is controlling and treating ticks in pasture, especially in rainy season. Sustainability of organic dairy farming needs research works to improve organic farm management and to reduce cost of organic milk production.

Key Words: Organic dairy farming, Organic Best Management Practices (OBMP), Sustainability, Milk production, Cost, Feed supplement plan

INTRODUCTION

Dairy farming was started in Thailand for more than 80 years when the Thai-Danish Dairy Farm and Training Center was established in 1962 at Muaklek District, Saraburi Province. Since then, the patterns and techniques of dairy farming were promoted to farmers throughout the country in order to produce milk to meet the domestic demand.

With variety of land conditions, there are various systems of dairy farming in Thailand. At the early stage, dairy farming focused on growing pasture and forage crops, and supplying concentrates to the needs of dairy cattle. At present, due to increasing of herd size
and land used, the pattern of dairy farming have changed to growing economic crops in order to make additional incomes for family.

Nowadays, consumers are interested in buying organic foods especially among those health concerned, elderly, children and students who believe that organic foods are high quality, safety and value. This situation make the growth rate of organic foods in the market is steadily increased during the last 5 to 6 years.

The Dairy Farming Promotion Organization of Thailand (D.P.O.) has interested in organic dairy production system and believes that this type of high quality milk could be a good choice for both dairy consumers and producers. The board committee of the D.P.O. then agreed to create an organic dairy farm for studying the organic dairy production, investigating suitable techniques and standards of all practices, and being as a model for organic dairy farming in Thailand. Knowledge, information and experiences getting from all practices in this organic dairy farm model have been disseminating to farmers and other interested people.

**Objectives**

1. To study the organic dairy production system
2. To find and develop appropriate management practices for successful and sustainable of organic dairy farming

**Approach**

The D.P.O. organic dairy farm was created in June, 2007. Since then this organic dairy farm has been operated under the Thai Agricultural Commodity and Food Standard (TACFS 9000 – 2005: Organic Agriculture Part 2: organic Livestock). The details are as follows.

1. Farm area

The D.P.O. organic dairy farm is a dairy farm that was separated from the Thai-Danish conventional dairy farm. This farm is at Muaklek District, Saraburi Province, (approximately 1 kilometer from the Thai-Danish conventional dairy farm), and has been using for training in organic dairy farm management practices to dairy farmers. The farm area consists of 7.2 hectares (45 rais) for grazing pasture and 13.7 hectares (86 rais) for forage and crop productions. These areas had not been applied synthetic or inorganic fertilizers and chemicals in the pasture for more than 3 years.

2. Animal breeds

The 39 dairy cows are 75 to 93.5% Holstein Friesian (HF) crossbreds (6 to 25% local breed), which were recruited from Thai-Danish conventional dairy farm since beginning in June, 2007. These cows were selected and planned for reducing Holstein Blood Levels (breed fractions) to be between 75 to 87.5% HF, which has been suggested to be suitable for organic dairy farm under Thai tropical conditions. These cows are bred not only for tick resistance but also for good characteristics such as feet and legs and mastitis resistance.

3. Housing and living condition
Housing for organic dairy cattle consists of a milking barn for 25 milking cows, and housing pens with the area of 800 square meters, high roof and good ventilation. The cows stay comfortably, not cloudy, in clean and dry stable. The cows can access to outdoors and pasture daily, especially in winter and dry season.

4. Health care practices

Good quality feed and forages are provided to keep cows healthy and least stress conditions that emphasized prevention. Body condition score checking and recording are weekly applied for every cow along with the udder examination by checking milk with C.M.T(California Mastitis Test) techniques before milking. Cows with low body condition score will be separated and then taken care by providing extra feed to meet nutritional requirements. The farm follows the organic health care standards to avoid using prohibited synthetic products such as antibiotics, hormones, etc. Disease prevention is to vaccinate F.M.D. vaccines to all cows twice a year.

5. Organic farm management system

The D.P.O. organic dairy farm has taken care and paid attention to dairy cows closely. Good quality feeds are provided in the sufficient quantities throughout the year. The farm management is to feed roughages as main feed which include grass in pasture, fresh-cut forages, silages and hay in dry season. Purchased organic-certified rice bran extract and farm-produced fermented cassava chip, as concentrate, are also fed as supplement. The cows are able to graze in rotated pasture and obtain daily fresh-cut grass in the barns. Dairy calves are raised in Thai-Danish conventional dairy farm after calving and brought to this organic farm when they are heifers and ready to be bred.

6. Record keeping and utilizations

All activities occur daily in the D.P.O. organic dairy farm are recorded. Daily management lists of records are health record and breeding record, milk yield and feed offering. All inputs for feed products, receipts and certification for all purchased organic inputs are also kept on file. In addition, these records will be analyzed for improving the farm management and cost calculating of organic production.

RESULTS

1. Organic Best Management Practices (OBMP) for holistic farming sustainability

Knowledge information and experiences from operating the D.P.O. organic dairy farm can apply to be Organic Dairy Best Management Practices (OBMP). These can be used to support newly transitioned organic dairy farmers and those consider making decision to organic dairy farming. The management practices will emphasize on feed supplement plan.

1.1 Feed supplement plan

The key success of organic dairy production of the D.P.O. organic dairy farm is to formulate the nutritional requirements of all organic dairy cattle throughout the year. Then, set a feed supplement plan to grow forages and crops in the farm and organic certified feeds
need to be purchased in order to feed all cows to meet the requirements. The feed supplement plan of the farm is shown in Table 1.

Table 1 Forage and crop supplement plan of the D.P.O. organic dairy farm

<table>
<thead>
<tr>
<th>Pasture No.</th>
<th>(arearai)</th>
<th>Forage</th>
<th>Usage</th>
<th>Forage Production per/year, tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>9</td>
<td>Guinea grass</td>
<td>FreshGrass/Hay/Silage</td>
<td>414</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>Guinea grass</td>
<td>Grazing</td>
<td>192</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>Napier grass</td>
<td>Fresh Cutting</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guinea grass</td>
<td>Fresh Cutting</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sugar cane</td>
<td>Fresh Cutting</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Animalfeed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Cassava</td>
<td>Leaves and Stems</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>silages</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fermented cassava chip</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leucaena</td>
<td>Fresh and Silages</td>
<td>6</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
<td>Cassava</td>
<td>Leaves and Stem silages</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fermented cassava chip</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total forage production</td>
<td>792</td>
</tr>
</tbody>
</table>

Yearly forage production offheD.P.O. organic dairy farm can supply to organic dairy cattle according to seasons of the year in Table 2.
Table 2 Seasonal organic feed supplement

<table>
<thead>
<tr>
<th>Feed Lists</th>
<th>Dry Season (Feb to May)</th>
<th>Rainy Season (Jun to Sep)</th>
<th>Winter Season (Oct to Jan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Organic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roughages</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Grazing grass</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Cutting grass</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>• Grass silages</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>• Grass hay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Organic supplied crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Leucaena silage</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>• Dry cassava leaves</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>• Leaves and stems of cassava silages</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>• Fermented cassava chip</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Purchased organic feeds</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Rice bran extract</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.2 Herbal remedies for control and treatment of tick

A major problem in the management of D.P.O.organic dairy farm is the control and treatment of cattle tick in pasture, especially in rainy season. The principles of organic dairy production is not allowed using synthetic pesticides, so that the farm try to use natural organic substances such as seeds of Annoma, neem seed oil and wood vinegar to control ticks in cows. It was found that the use of wood vinegar from coconut shell can repel ticks from cows effectively. It is probably due to wood vinegar from coconut shell has tar substance, which sticks to cow’s hair better than other types of wood vinegar. The use of vinegar can spray once week with the ratio 100 ml vinegar per 10 liters of water.

2. Impacts of transition to organic dairy production

2.1 Time frame of transition
This D.P.O. dairy farm started transitioning to organic dairy farming in 2007 by collecting information and discussing with advisors in organic dairy production standards. During the first two-years, trial had been done using organic feed for 70% and the rest was non-organic concentrate without urea consisting. The aim of that was to keep the cows adapted and be familiar with organic feeds, while growing organic forages and crops had been done along with finding organic feed supplies from outside of farm such as organic rice bran extracts for energy source. Completely transitioning with 100% organic feeds occurred in June 2009. The D.P.O. organic dairy farm is the first organic dairy farm in Thailand that has been certified as organic dairy farm in June, 2011. The organic transition period spent for 24 months (2 years).

2.2 Cost of organic milk production

Nowadays, the total number of dairy cows in the farm is 43 with 27 milking cows and 16 dry cows. Daily milk production is 260 kg (9.8 kg in average per cow). Milk selling price is 25 baht per kg while cost of production is 23.95 baht per kg. Cost of production slightly reduced in June-September and higher in February-May. The reason might be due to feed supplies in rainy season with available of green grass and forages and cows can graze at all time and also cut and carry, so that cost of production reduces consequently.

2.3 Sustainable milk production

Experience and knowledge from operating this organic dairy farm, it appears that, in order to sustain milk production, organic dairy farmers have to emphasize on producing high quality organic forages and crops on the farm. The quantity of these producing feeds should be sufficient for the whole herd. Least quantity of certified organic feeds could be purchased to supply cows to meet nutritional requirements. Grazing pasture is also needed to improve quality and well-managed. It is important to know the nutritive values of various feeds, including pasture, fed to cows and supplement the nutrients lacking. The nutritive value will be used to formulate the amount of feeds cows receive on a daily basis. This ration should be consistent as possible, especially for milking cows. As a result, cows could maintain good body condition and healthy and give milk yield consistently.

In addition, research information and knowledge in organic dairy farming system in Thailand are very little. The sustainability of organic dairy farming needs research works that can support and help to improve organic dairy farm management and to reduce cost of organic milk production. Research needs such as improvement of dairy breed that appropriate for organic dairy farm, with regard to suitability of organic dairy management system and resistance to prevalent diseases and parasites. Suitable herbs are also needed for treating, diseases preventing and stress in organic dairy cattle.

The increment in quality and production of organic crops needs to be improved, which considering to breed of organic crops and seeds in term of pest resistance and organic soil fertile. The methods to control weeds and insect pests in organic crop’s fields are also needed to be studied.

ACKNOWLEDGEMENT

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REFERENCES

The Organic Dairy Handbook, Edited by Katherine Mendenhall, 2009, 304p
