PROCEEDINGS

5th SAADC 2015

The 5th International Conference on
Sustainable Animal Agriculture for Developing Countries

"CLIMATE SMART SUSTAINABLE ANIMAL AGRICULTURE FOR FOOD SECURITY AND LIVELIHOOD IMPROVEMENT IN THE DEVELOPING COUNTRIES"

October 27-30, 2015, Dusit Thani Pattaya Hotel, THAILAND

Jointly organized by

PROCEEDINGS

of

The 5th International Conference on

Sustainable Animal Agriculture for Developing Countries

(SAADC 2015)

October 27-30, 2015

Dusit Thani Pattaya Hotel, Thailand

Jointly Organized by:


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Message from the President of RMUTI

Dear Participants,

It is my great honor to welcome all of participants to attend the 5th Sustainable Animal Agriculture for Developing Countries (SAADC) conference which held at the Dusit Pattaya Hotel, Chonburi, Thailand during 27-30 October 2015. It is also 10 years Anniversary of Rajamangala University of Technology Isan (RMUTI), which established depending on Rajamangala University of Technology Act B.E. 2548 (2005). On behalf of RMUTI, I would like to welcome about 350 participants from 40 countries to participate at the conference. The principal objective f SAADC is to provide a venue for animal scientist, agriculturist, farmers and private sectors to build up the relationship and to exchange their experiences.

The 5th SAADC 2015 is organized by seven institutes such as Rajamangala University of Technology Isan (RMUTI); Suranaree University of Technology (SUT); Mahasarakham University (MSU); Silpakorn University (SPU); Mahanakorn University of Technology (MUT); Nakhon Ratchasima Rajabhat University (NRRU) and Udon Thani Rajabhat University (UDRU).

All sponsors are highly appreciated to make the conference more successful. Last but not least, all partners who contributed to this conference are deeply thanks without your fully supports this conference would never be accomplished.

With best wishes,

Assistant Professor Dr. Viroj Limkaisang

President of RMUTI

27 October 2015

Message from President SAADC International Advisory Committee

Ladies and Gentlemen,

First and foremost, I would like to thank the Organising Committee of the 5th International Conference on Sustainable Animal Agriculture for Developing Countries (SAADC2015) for inviting me to pen a few words in this Souvenir Programme.

I would like to take this opportunity to share with you, especially those who are attending the SAADC series of conferences for the first time that SAADC has grown steadily since the inaugural SAADC2007 organised by Yunnan Agricultural University in Kunming, China. The numbers of participants and countries involved have increased from less than 200 from seven countries in the inaugural conference to more than 300 from 40 countries in this conference. This reflects the relevance of SAADC in providing a platform for animal scientists and producers especially from the developing countries to share experience and network to promote sustainable animal agriculture in our respective countries.

This week we are here again to present our research findings and ideas for promotion of sustainable animal agriculture. I congratulate the Organising Committee for their hard work throughout the last two years to make it possible for us to meet in one of the world renowned beach resorts in Thailand. I would like to thank members of the SAADC2015 International Advisory Committee and the SAADC2015 in-house editors for their input and hard work to support the local organising committee of this conference. Special thank goes to Dr Chris Anderson of the CSIRO Publishing for his help to create the SAADC2015 special issue in the journal of *Animal Production Science* for publication of selected papers presented by the participants of this conference.

Most of all, I thank each and every one of you for your participation in making this conference a great success. I would like to encourage all participants, particularly the younger ones to take this opportunity to make new friends and to create new opportunities to foster cooperation towards promotion and enhancement of sustainable animal agriculture in our respective countries.

Yours sincerely,

Professor Dr. Juan Boo Liang

President
SAADC2015 International Advisory Committee
27 October 2015

Message from the Chairman of the 5th SAADC Conference

On behalf of Rajamangala University of Technology Isan (RMUTI), I would like to express my deeply thanks to the SAADC International Advisory Board (IAB) for their agreement to permit RMUTI to organize the 5th SAADC conference together with our co-hosts institutes, these are Suranaree University of Technology (SUT), Mahasarakham University (MSU), Silpakorn University (SPU), Mahanakorn University of Technology (MUT), Nakhon Ratchasima Rajabhat University (NRRU) and Udontani Rajabhat Unversity (UDRU).

The 5th SAADC 2015 consists of scientific session, private sector demonstration, social and cultural activities. The scientific session offers plenary session, invited session, symposium and graduate course. The symposium is an entitled on "Understanding of Biological Product: The role for sustainable Animal Production" by Associate Professor Dr. Kriengsak Poonsuk (K.M.P. BIOTECH CO., LTD). The workshop is an established on "Publishing Your Research Findings in International Journals" by Dr. Thomas J. Schonewille (Utrecht University, The Netherlands). The cultural activities are Thai regional dancing (Fon Ram) with the contributing of Rajamanagala University of Technology Tawan-ook. Field trips are based on two routes: Route I is a "Dairy Buffalo Farm: Runjaun Farm" and Route II is a tropical garden so called "Saun Nongnooch".

I would like to express my sincerely thanks for the keynote, plenary, invited speakers and participants who had been fully supported to make the conference more success and fruitful.

I deeply appreciate to the International Advisory Board (IAB) and the local organizing committee for their great effort and dedication to make the proceeding in time.

Last but not least, I would like to sincerely thanks to President of RMUTI for his fully supports to make this conference successful.

Wish best wishes.

Assistant Professor Dr. Chalermpon Yuangklang

Chairman of the 5th SAADC 2015
Dusit Thani Hotel, Pattaya, Chonburi, THAILAND

Message from Academic Committee Chairman

As the host of the 5th International Conference on Sustainable Animal Agriculture for Developing Countries (SAADC2015), Rajamangala University of Technology Isan do realize the significance of research, innovation and application in terms of international development of economics and society. The SAADC 2015 conference has its objectives to provide a chance for researchers in field of animal science, agriculture and related fields including academicians, researchers, administrators and private sectors both in developing and developed countries to share their own experiences, to develop collaborative networks among institutions and to strengthen research quality of staff and students for sustainable animal agriculture production.

From the number of oral and poster presentations submitted in this conference in Pattaya, I do impress your participation and have confidence that you all are the scientists with very great enthusiasm to solve problems as well as to share valuable information and knowledge for people prosperity.

I would like to particularly thank all guest speakers and participants who make this conference such a valuable collaborative and successful forum. My sincere thanks go to our co-organizing committee form Suranaree University of Technology, Nakhon Ratchasima Rajabhat University, Mahasarakham University, Mahanakorn University of Technology, Silpakorn University, and Udon Thani Rajabhat University. Special thanks to the scientific committee, reviewers and editorial boards for their great contribution to make the conference successfully organized.

I believe all delegates will benefit substantially from the conference through the presentations of expert speakers and exchanges of ideas with one another. I wish you all have most pleasant and most wonderful time in the conference in Pattaya, Thailand and a safe journey home.

Assistant Professor Dr. Kraisit Vasupen

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Growth performance of carrageenan-producing seaweeds of *Kappaphycus* and *Eucheuma* in Sumbawa

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Abstract

This research purpose is to address growth performance of carrageenan-producing seaweeds of *Kappaphycus* and *Eucheuma*. The research was conducted in coastal area of Kaung Island, Buer sub-district, Sumbawa Regency from August to September 2012. Importance of *Eucheuma/Kappaphycus* spp. for Indonesian economy and farmer livelihood are main source of hydrocolloids and main source of income. West Nusa Tenggara is one of the production center for *Eucheuma/Kappaphycus* in Indonesia. The method used for this study was planting seaweed using long-line system involving 25 farmers. The species planted were *Kappaphycus alvarezii* Tembalang, *Kappaphycus alvarezii* Maumere, *Kappaphycus striatum* and *Eucheuma spinosum.* The growth of *Eucheuma* spp was measured every 7 days until harvesting time which is 45 days. Initial seed weight was 100 g and the number of seeds perline were 200. Purphoses sampling done by 5 samples per line for analysis of fresh weight, dry weight, carragenan content and incident disease.The result of this research shows that the increase in weight *Kappaphycus alvarezii* Tembalang is 0,82 grams/day, *Kappaphycus alvarezii* Maumere is 0,06 grams/day, whereas that of *Kappaphycus striatum* is 0,97 grams/day and *Eucheuma spinosum* is 5,59 grams/day. It can be concluded that *K. alvarezii*, *K. striatum a*nd *E. spinosum* can grow in Kaung, *E. spinosum* is more adaptable to Kaung ecology, and can be grown throughout the year.

Keyword: cultivation, long line, fresh weigth, dry weight, adaptable.

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Introduction

The development if seaweed cultivation to improve community's prosperity in NTB is supported by economic potency and large cultivation area. As an illustration, data of economy survey in 2010 show that seaweed farmer revenue in NTB ranged from Rp. 26.538.000 to Rp. 60.458.500 per year, in which the potency of cultivation area reached 25.206 hectares (Pemda NTB, 2011). However, the use of this area just reached 44% with total production of dry seaweed was 221.047 tonnes (Pemda NTB, 2011).

Economically, seaweed cultivation is one of productive businesses within coastal area which brings benefit. Besides accelerating seaweed harvest time (30 to 50 days) and cultivation that does not need a complex maintenance, seaweed (*Eucheuma*/*Kappaphycus*) cultivation in NTB is also an important source of livelihoods that improves community's revenue along the coastal area. This is because the cultivation of seaweed can bring revenue which is 26 to 60 million rupiahs per year and it depends on cultivation method used and the total area of cultivation.

In the other hand, dry seaweed production in NTB just reached 220,000 tonnes, and this value is less than the potency of production which is more than 1 million tonnes per year (Pemda NTB, 2011). Seaweed is not only an important source of alternative livelihood for farmers, but also a source of hydrocolloid used in many industries. Some of these industries are pharmacy, food, paint, and cosmetic that uses carrageenan as one of raw materials.

According to those facts, the local government of NTB has taken strategic steps including extension and intensification of seaweed cultivation in order to improve seaweed production in NTB and increase locally-generated revenue. This effort also aims to grow economic business which is productive that benefits coastal community that generally has low income. From the perspective of NTB, extension of seaweed cultivation directed to Sumbawa Island has a big potency because of the extent of potential area that has not been used which is more than 50% out of 20.200 hectares of potential area for seaweed cultivation in Sumbawa Island. Kaung Island is a potential area to develop cultivation of many species of seaweed such as Kappaphycus and Eucheuma. According to this fact, there is a need of a research to address the growth of and carrageenan from *Kappaphycus and Eucheuma* cultivated in marine area of Kaung Island.

Material and Methods

The method used for this study was planting seaweed using long-line system involving 25 farmers. The species planted were *Kappaphycus alvarezii* Tembalang, *Kappaphycus alvarezii* Maumere, *Kappaphycus striatum* and *Eucheuma spinosum.* The growth of *Eucheuma* spp was measured every 7 days until harvesting time which is 45 days. Initial seed weight was 100 g and the number of seeds per line were 200. Purphoses sampling done by 5 samples per line for analysis of fresh weight, dry weight, carragenan content and incident disease.

Seaweed was planted from August to September 2012. The seed used was introduced from seed bed in Gerupuk Bay area and Mid-Lombok Regency. Data of weight increase was calculated using following formulas:

Increase of weight = weight on t (time) – initial weight

Growth rate (% per day) = ((ln W_t *- ln* W_o*)/ t) x 100*

Analysis of carrageenan was done by extracting seaweed, cooked with pressure on temperature of 100ºC for 2 to 3 hours until seaweed turned into a gel, with alcohol. The analysis of carrageenan was done in Immunology Lab, Faculty of Math and Sciences, Universitas Mataram.

Results and discussion

The result of measurement of four 4 seaweed species cultivated on four ropes on this study is shown on the table 1.

Table 1. Average weight of seaweed (g) cultivated between August and September 2012.

No.	Species	Day-							
		0	7	14	21	28	35	42	49
1.	*E. cottonii (tembalang)*	100	146	178	207	156	112	130	140
2.	*E. cottonii* (maumere)	100	148	166	120	103	82	99	103
3.	*E. spinosum*	100	146	178	213	262	300	337	374
4.	*E. striatum* (sacol)	100	146	179	210	169	126	138	148

Weighing was done for each clump with 180 times of repeat per unit

According to the data, decreasing weight is experienced by *E. cottonii* Tembalang, *E. cottonii* Maumere, and *E. striatum*. This condition generally happens on day 28. The decreasing weight is caused by *ice ice* disease that caused seaweed thallus to break. The data of weight increase shows that *E. Spinosum* production reaches 74 Kg per 100 m^2.

Seaweed species of *E. spinosum* constantly experiences increasing weight although this species is attacked by *ice ice* disease. *Eucheuma spinosum* also has the highest growth compared with other species of seaweed. The data also show that there are some seaweed clumps from species of *E.* cottonii tembalang and maumere, and *E.striatum* gone because of *ice ice* attack.

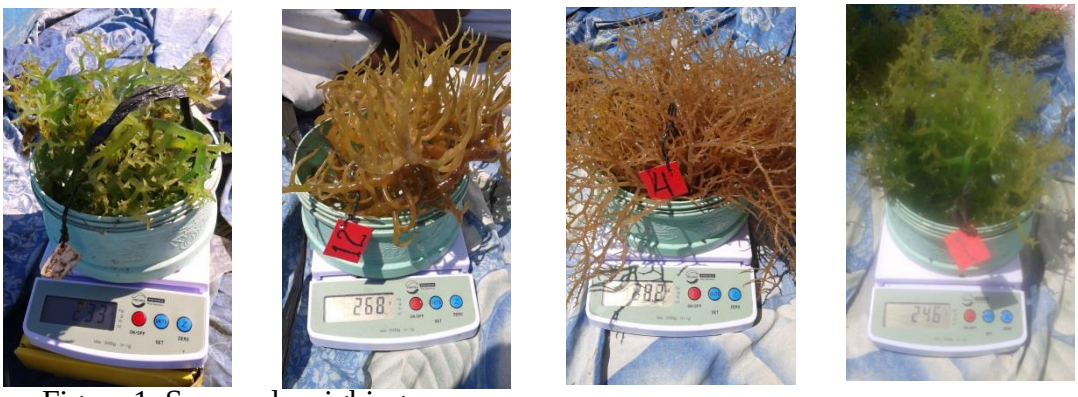

Figure 1. Seaweed weighing

Following are the ratio between wet and dry weights of each seaweed species on different planting days. Sample was taken from ropes for research purpose. Drying was done on the top of *para-para* for 3 days.

Table 2. The ratio between wet and dry weights of seaweed.

No.	Seaweed	Weight measurement (g)											
		Day 28			Day 35			Day 42			Day 49		
		W	D	D/W	W	D	D/W	W	D	D/W	W	D	W/D
1	*E. cottonii (tembalang)*	156	20	0.12	112	15	0.13	130	13	0.1	140	13	0.09
2	*E.cottonii* (maumere)	103	14	0.13	82	11	0.13	99	9	0.09	103	9	0.08
3	*E.spinosum*	262	42	0.16	300	49	0.16	337	54	0.16	374	60	0.16
4	*E. striatum* (sacol)	169	21	0.12	126	17	0.13	138	16	0.11	148	15	0.10

Weighing was done for each clump with 180 times of repeat per unit

According to table above, it can be seen that the highest ratio between wet and dry weights is experienced by *E. spinosum*. The ratio between wet and dry weights can represent water content in seaweed. The higher the ratio, the lower water content in seaweed, a fact which means that the higher dry seaweed production.

The result of measurement of seaweed sample done in Immunology Lab, Faculty of Match and Sciences, Universitas Mataram is shown on following figure 2.

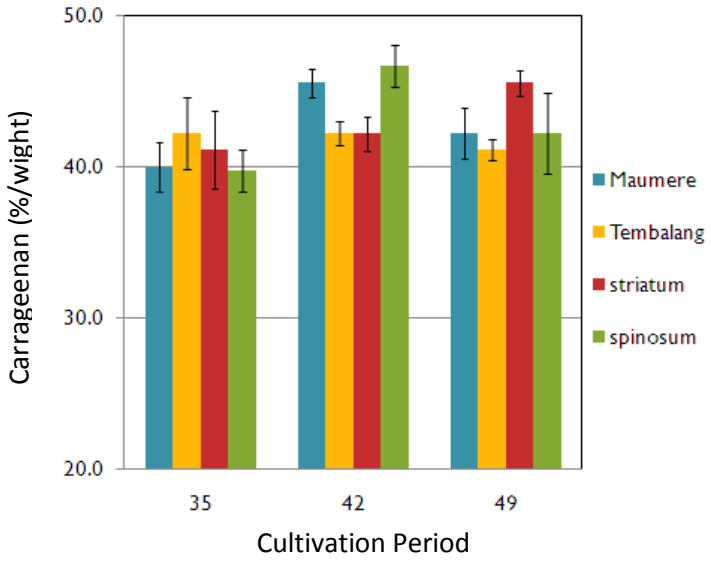

Figure 2. Percentage of Carrageenan in many Species and Cultivation Periods

The content of seaweed carrageenan in *E. spinosum* and *K. alvarezzi* strain maumere cultivated for 42 days tends to be higher compared with that of cultivated for 35 and 49 days, whereas the carrageenan content in *E. striatum* tends to increase gradually until day 49 of cultivation. Carrageenan content of *K. alvarezzi* (tembalang) tend to be stabile on the three cultivation periods.

Conclusion

K. alvarezii, *K. striatum a*nd *E. spinosum* can grow in Kaung. *E. spinosum* is more adaptable to Kaung ecology, and can be grown throughout the year.

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Table 2. Percentage of sperm motility following treatment with different Noni (*morinda citrifolia*) extract level after cooling.

Time of cooling (h)	Noni extractlevels (%)	Mean ± *SD*
0	0	69.00 ± 2.11^{b}
	10	73.00 ± 3.50^{a}
	20	68.00 ± 4.22^{b}
	30	67.50 ± 4.25^{b}
24	0	62.00 ± 4.22^{a}
	10	64.50 ± 3.69^{a}
	20	56.00 ± 3.94^{b}
	30	53.50 ± 2.42^{b}
48	0	52.00 ± 2.58^{a}
	10	54.00 ± 3.94^{a}
	20	43.50 ± 2.42^{b}
	30	42.00 ± 2.58^{b}

[a, b] highly significant different ($P<0.01$).

Discussion

The results showed that the level of Noni (*morinda citrifolia*) extract had very significant effect ($P<0.01$) on sperm motility percentage in 0, 24 and 48 h of cooling. Levels 10% Noni (*morinda citrifolia*) extract produced the highest percentage of motility of spermatozoa, followed by the level of 0%, 20%, and 30% Noni (*morinda citrifolia*) extracts. Sperm motility decreased gradually as the duration of cooling. The longer the cooling the lower the sperm motility and viability. Decrease in the percentage of sperm motility after cooling is due to fewer sperm that have sufficient energy reserves to be used to move, as long as the cooling sperm remain metabolic activity. Exogenous substrates during cooling required for mitochondrial ATP availability is limited. Secondary metabolites materials required for energy and buffer as well as antioxidants to protect sperm from damage due to the accumulation of CO_2, lactic acid and free radicals (Kaeoket et.al., 2011; Tavilani et. al., 2008). It can be concluded that thebestNoni (*morinda citrifolia*) extract level for resulting optimal sperm motility was 10%.

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Materials and Methods

This research has been carried out in North Sulawesi by using the survey method. The district has been determined by purposive sampling the district has the largest cattle population is South Minahasa and Bolaang Mongondow. Respondents in this study were 150 farmers for the South Minahasa District and 65 respondents to Bolaang Mongondow. The data collected is primary data and secondary data. Analysis of the data used is descriptive analysis and multiple regression analysis.

Results and Discussion

Cattle farmers in the research area has largely been developing cattle integrated with coconut plantations. System integration cattle and crops are often considered as a step forward. Land held by farmers in the area of research, ranging from 0.5-3 ha. Most of the land owned by the farmers according to the results of research conducted Rundengan (2013), ranging between 1-1.5 ha. Land tenure is very supportive of efforts for the development of local cattle, because according to Hermawan & Utomo (2012) of local cattle is a strategic commodity with multiple functions for dry land farmers. The development of beef cattle cannot be separated from the development of agriculture and plantation (Hartono, 2012). Results of regression analysis, income from cattle farming, which is integrated with coconut and corn accordance Rundengan (2013) can be seen in the following equation:

$$Y = 779{,}524 + 7{,}295{,}119LH - 3.24PKN - 1.75PO - 1.16PS - 0.14TKS \quad \text{.....(1)}$$

Income from the cattle farming is affected by the plantation area. Increasingly plantation area (LH), then the income tends to increase (Equation 1). Coconut is a commodity that is in separable from public life. Coconut dubbed the tree of life, because of coconut has aroleto people's lives, from the fulfillment of social needs, culture until the economic interests.

Equation (1) shows the cost to feed (PKN) the higher cause income tend to decline. The indication, with an integrated cattle farming, the waste from the farm under the coconut trees can be used as feed. Local cattle farming, managed by farmers without the cost of feed (zero cost). Advantages of application integration pattern can be obtained because of the synergy between activities, which in turn almost no resource is wasted (zero waste). Farmers for crops has not optimally utilize agricultural waste even some farmers burning the waste which can affect the loss of main nutrients, such as NandP, kill organisms in the soil and producesCO2gasthat damage the environment.

Increase in the cost of organic fertilizers (PO) cause income tend to decline (Equation 1). According to Haryono (2013), the use of compost as organic fertilizer, a choice in favor of an increase in the productivity of food crops. Development of local cattle, will have a negative impact on environment, due to the waste generated from the cattle farming. According Harlia et al. (2012), waste from cattle is increasing, causing nature is not able to decipher, absorb and neutralize the waste. Local cattle, for farmers, in this case, serves as a producer of manure (Roehani et al., 2005), as an organic fertilizer raw materials. Baba et al. (2012) suggested that the integration of cattle corn, provide many advantages for both farmers (increase income and food security), local cattle (sustainability feed), and land (conservation land). Land degradation at this time, a problem faced by many countries (Herrick et al., 2010), including our country. Waste utilization of local cattle, as organic fertilizer, which is useful to the plant, as well as improve the

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GROUP










Betagro Public Co., Ltd.

บริษัท เบทาโกร จำกัด (มหาชน)

History

Founded in 1967 with a registered capital of Baht 10 million, the Betagro Group began as a single entity, Betagro Company Limited, to produce and distribute animal feed. Its headquarters were originally located in Pom Prab, Bangkok, and its first feed mill in Prapadaeng, Samut Prakan province.

Betagro Group focuses on the food business in both domestic and international markets with an integrated agro-industrial production base. Betagro classifies its operation in five major categories:

The Thailand Research Fund; TRF

สำนักงานกองทุนสนับสนุนการวิจัย; สกว.

The Thailand Research Fund (TRF) was established in response to the 1992 Research Endowment Act and although it is part of the government system, it lies outside the government administrative bureaucracy. This freedom allows great efficiency in research support. Since its creation, TRF has remained focused on its main duty: supporting at both local and national levels the creation of a knowledge-base to help those tackling societal problems.

AGRICULTURAL RESEARCH DEVELOPMENT AGENCY (PUBLIC ORGANIZATION)
สำนักงานพัฒนาการวิจัยการเกษตร (องค์การมหาชน)

Background

Due to the economic crisis in B.E. 2540 (1997), the government has set austerity measure in spending the budget. Resulting many projects has to balk. The government has agreed to borrow the funding from abroad to continue the project. The Cabinet has approved to abide by the conditions of policy matrix. Loan program to restructure the agricultural sector to enhancing the competitiveness of the export on 6th July B.E. 2542 (1999)

Agricultural Research Development Agency (Public Organization), ARDA was established as an autonomous agency in the operating fund as the decree establishing the Agricultural Research Development Agency that become effective from 15th March B.E. 2546 (2003) (with the initial capital of 3,000 Million Baht)

CPF (Thailand) Public Co., Ltd.

บริษัท ซีพีเอฟ (ประเทศไทย) จำกัด (มหาชน)

Charoen Pokphand Foods Public Company Limited is the leading agro-industrial and food conglomerate in the Asia Pacific region. The Company operates in both the livestock (swine, broilers, layers, and ducks) and aquaculture (shrimp and fish) businesses. The vertically integrated businesses incorporate the manufacturing of animal feed, animal breeding and animal farming; meat processing, the manufacturing of semi-cooked meat and fully-cooked meat; food products and ready meal products, as well as the meat and food retailer and restaurant businesses.

Feed Business 

Farm Business 

Food Business 

Lannacom Co., Ltd.

บริษัท ลานนาคอม จำกัด

บริการให้คำปรึกษา ออกแบบ จำหน่าย ติดตั้ง ซ่อมแซมและบำรุงรักษา ที่เกี่ยวกับระบบเทคโนโลยีสารสนเทศและการสื่อสาร ได้แก่ โครงสร้างพื้นฐานของระบบเครือข่ายคอมพิวเตอร์ ระบบรักษาความปลอดภัยระบบเครือข่ายคอมพิวเตอร์ ระบบโสตทัศนูปกรณ์สารสนเทศ และระบบโทรศัพท์

Dutch Mill Co., Ltd.

บริษัท ดัชมิลล์ จำกัด

Office of the Higher Education Commission; OHEC

สำนักงานคณะกรรมการการอุดมศึกษา; สกอ.

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Behn Meyer Chemicals (T) Co., Ltd.

บริษัท เบ็นไมเยอร์ เคมีคอลส์ (ที) จำกัด

Beef Cluster Cooperative Limited

สหกรณ์เครือข่ายโคเนื้อ จำกัด

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