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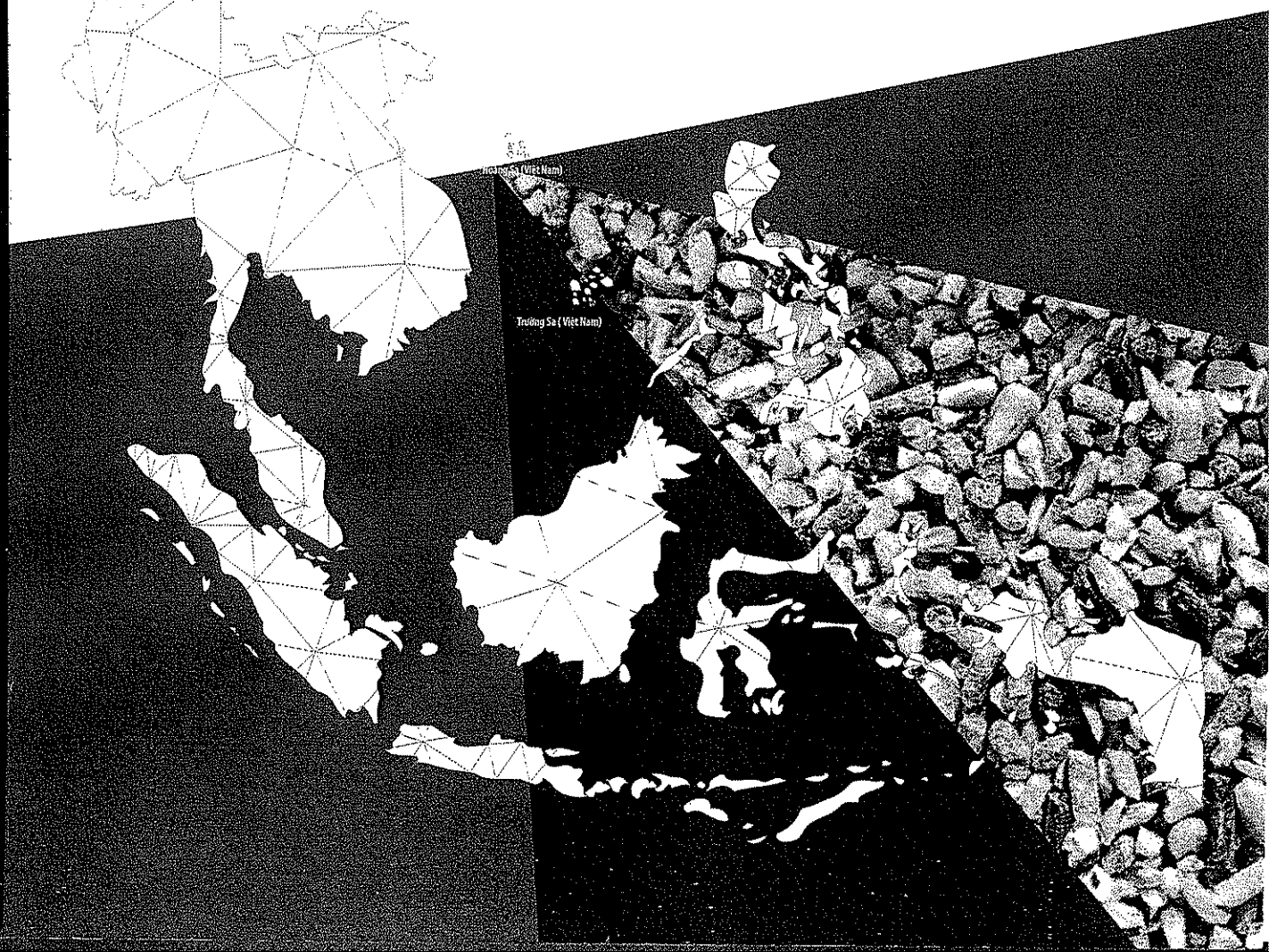

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F9: A SURVEY ON SOURCE OF AGRICULTURAL PRODUCT AND BY-PRODUCT IN PHITSANULOK PROVINCE FOR UTILIZATION AS ROUGHAGE FOR RUMINANT

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ABSTRACT

The purposes of this research were toexplore the source of product and by-product from agricultural and evaluated chemical composition of agriculturalby-product in MuangPhitsanulok (MP), Nern-Maprang (NM) and Nakhon-Thai (NT) districts, Phitsanulok Province. The purposive samples used by a questionnaire and surveying were 362 farmers. The data was statistical analysis using a linear model that considered all factors as fixed effects. Least squares means for subclasses of each factor were estimated and they were comparedusing t-tests. In addition, the agricultural product and by-product was collected from surveying area and was analysedchemical composition by AOAC method. The results revealed that cultivating area (CA) , average yield (AY), and average by-product (AP) were affected by farm location-source of by-product ($p<0.01$). Farmers from MP district had the higher CA,AY, and APfrom rice than NT and NP districts, respectively, except for CAfrom NP and NT districts. In contrast with all locations of farmers had CA, AY, and AP from corn.Considering the results of chemical composition were showed that the chemical composition of corn stover, corn foliage and rice straw consists of dry matter 77.58%, 94.00%, and 97.20%, ash 7.40%, 14.05%, and 13.28%, crude protein 6.32%, 3.10%, and 5.06% crude fat 1.82%, 2.15%, and 2.39% and crude fiber 22.87%, 24.90%, and 34.09%, respectively.These results implied that, in order to improve average yield, average and quality of by-product from agricultural in difference farm location and source of by-product, require the different strategyto prevent and solve the problem.

Key words: Agricultural by-product, roughage, ruminant

INTRODUCTION

The main problem of beef cattle farmers is a lack of roughage in dry season. Due to they always raise cattle in nature pasture, and nature pasture is limited with low nutrients, low digestibility and low voluntary intake. It's also important to realize that tropical grass mature declines more rapidly than temperate grass. Therefore, tropical grass may not meet the requirement of cattle. Accordingly, nature grass may fail to provide enough quality and quantity for suitable cattle production. But it is a widely known fact that Phitsanulok province has the large scale of agricultural area (5,102.83 km^2, Phitsanulok province agriculture extension office, 2014). Almost of plantation is agronomy (1772.82 km^2). Therefore, the high volume of agriculture by-product could be alternative roughage in Thailand because of the lower price of these by-products. Many researchers reported that crop residue can be used for cattle production. A simple crop residue in Phitsanulok province is rice straw. Because of rice production is the main product of our country. After harvesting rice in field, rice straw which generated from this harvest (around a third). But raw rice straw does not contain enough nutrients and low digestibility will result in low productivity of cattle. Moreover, by-product from cassava plant is interesting. Cassava production increases at a fast rate where cassava chip is used for generate ethanol production and tapioca starch production. A part of cassava residue is cassava foliate, which provides high protein and has a good result in ruminant (Wanapat, 1997). By-products from corn production is corn stover, corn cob and ear corn. Bal et al. (1997) showed the result milk production was highest when fed dairy cattle with corn silage at the two-thirds milkline stage. Sugarcane is concentrated in the central and lower northern in Thailand. Common sugarcane residue is bagasse trash and green leaves which have potential for feeding ruminant.Although the kind of agricultural by-product in Thailand was showed, amount and

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period of crop residue in Phitsanulok province is limited. Hence, this study explores the source of product and by-product and evaluated chemical composition of agriculturalby-productfrom agriculturein Phitsanulok Province.

MATERIALS AND METHODS

Farms and data

The survey was carried out from February to May 2014 inPhitsanulok province, lower northern Thailand.Three districts namely, MuangPhitsanulok, Nern-Maprang and Nakhon-Thaiwere selected purposively based on geography (plain, plateau and piedmont plateaus). The survey focused on the kind, amount and harvesting period of agricultural products and their residues. A dataset with 362 records about kind of plant, seed time, harvesting period, crops and their crop residue collected from plant farmers by using a semi-structured questionnaire. The studied traits composed of cultivating area (Ton/Rai), average yield(Ton/Rai) andaverage by-product (Ton/Rai). Farm identification number that created by the farmers were used for the analyses and also to link all related information. District of the individual farms was considered for farm location, which could be classified as MuangPhitsanulok (MP), Nern-Maprang(NM), and Nakhon-Thai(NT). Source of productfrom agriculturalof farmers were used to define as rice and corn.

Data analysis

Farm location-source of agricultural product of farmers were tested for their effect on cultivating area,average yield of product, and average by-product in SAS software (SAS, 2004). Least square means of the studied traits were estimated for the considering factors, and then were compared using t-test. Significant level for the comparison was considered at $\alpha = 0.05$.

Chemical composition analysis

The samples from agricultural by-product (corn stover, corn foliage and rice straw)were thawed at 4 °C for 24 h. prior all chemical analysis. Moisture, crude protein and ether extract were analyzed according to AOAC (2001). Briefly, the moisture content (%) was determined by using 2 g of sample in a crucible and dried at 105 °C for 24 h. Ash (%) was determined by using 2 g of sample in a crucible and burnt in a furnace at 600 °C for 3-4 h. Crude protein was analyzed by the Kjeldahl method (N × 6.25) using digestion (KB8S, Gerhardt, Bonn, Germany) and distillation apparatuses (Vapodest 10, Gerhardt, Bonn, Germany). Crude fat was extracted from the sample with dichloromethane by using Soxhlet apparatus (RH basic 1, IKA, Switzerland).

RESULTS AND DISCUSSIONS

The results from this study showed that the majority of farmers in this population depended on horticulture or agronomy such as rice, corn, cassava, and soy bean etc. These results were similar to those reported in literatures (e.g.,Thumronget al., 2005; Phitsanulok rice ewsearch center, 2014; Phitsanulok provincial agricultural extension office (2015b).Farmers from MP district had the highest ($p<0.01$) cultivating area from rice (30.23 ± 2.09 Rai), followed by farmers from NP district (23.89 ± 1.53 Rai) and NT district (13.33 ± 1.68 Rai), respectively. In contrast, Farmers from NT district had the highest cultivating area from corn (23.76 ± 2.09 Rai), followed by farmers from NP district (15.98 ± 1.53 Rai) and MP district (7.28 ± 1.68 Rai), respectively (Figure 1). This result was similar to the reported by Phitsanulok provincial agricultural extension office (2015b). This report confirmed that the ratio of land for cultivating area from rice and corn in 3 districts were 55.12% and 0.07% of MP district, 28.02% and 18.19% of NP district, and 16.86% and 81.74% of NT district, respectively. Moreover, These results agreed withPhitsanulok provincial agricultural extension office (2015a) reported

that information ofcultivating area for agricultural in MuangPhitsanulok, Nern-Maprang and Nakhon-Thai districts at Phitsanulok Province as showed in figure 2.

The pattern of farm location and source of agricultural production LSM for average yield from rice and corn was similar to that for average by-product from rice and corn. Farmers from MP district producedhigher average yield and average by-product from rice (23.76 ± 3.90 and 1.51 ± 0.02 Ton/Rai; $p<0.01$) than farmers from NT district (12.11 ± 2.18 and 1.08 ± 0.05 Ton/Rai) and NP district (9.76 ± 3.11 and 0.91 ± 0.06 Ton/Rai), respectively. On the other hand, Farmers from MP district (6.07 ± 1.22 and 0.45 ± 0.33 Ton/Rai; $p<0.01$) produced less average yield and average by-product from corn than farmers from NT district (16.55 ± 2.75 and 1.16 ± 0.05 Ton/Rai) and NP district (18.70 ± 2.32 and 1.34 ± 0.08 Ton/Rai), respectively (Figure 3 and 4). Average by-product from rice and corn patterns across farm location and source of agricultural production subclass was related to average yield from rice and corn. A similar pattern of average yield from rice and cornare in agreement with the works of Phitsanulok provincial agricultural extension office (2015b) who found that the ratio of land for average yieldfrom rice and corn in 3 districts were 37.51% and 20.22% of MP district, 30.76% and 40.15% of NP district, and 31.73% and 39.61% of NT district.

Moreover, the chemical composition of by-product were found from the results of the study that the chemical composition of corn stover consists of dry matter (DM) 77.58%, ash 7.40%, crude protein (CP) 6.32%, crude fat (CF) 1.82%, and crude fiber (CF)22.87%. Corn foliage consists of dry matter (DM) 94.00%, ash 14.05%, crude protein (CP) 3.10%, crude fat (CF) 2.15%, and crude fiber (CF)24.90%. and rice straw consists of dry matter (DM) 97.20%, ash 13.28%, crude protein (CP) 5.06%, crude fat (CF) 2.39%, and crude fiber (CF)34.09%. These values were close to those of the report in many literatures (e.g., Boonlom et al., 1999; Saowaluck et al., 1999; 2000). The results were in agreement with that reported by Li*et al.* (2014) who found that whole corn stover has 93.38% of DM (% of air-dry basis), 4.05% of CP, 1.31% of EE, 71.93% of NDF, 41.36% of ADF and 6.26% of ADL, respectively. While its leaves (corn foliage) has 92.88% of DM, 9.95% of CP, 1.49% of EE, 62.28% of NDF, 31.12% of ADF and 4.43% of ADL, respectively. The Compositions of rice straw was indicated by Department of Livestock Development, Thailand (2004) that DM, CP, CF and EE are approximately 90.16%, 5.23%, 0.93% and 29.78%, respectively.

However, most of source of agricultural product and by product or wastes in Thailand used for utilization as roughage for farmers raise beef cattle, dairy cattle, and buffalo were derived from economic crops such as rice, corn, suger cane, pineapple, and cassava. These agricultural product and by product were sufficient in quantities for ruminants feeding due to their large production. These responded to solve feed deliciency in some season. Therefore, to use in ruminants feeds farmers must be proceeded or improved in qualities (Sompong, *et al.*, 2007; Vatsana, 2008; Chirawat*et al.*, 2009; Sarnklong*et al.*, 2010).

CONCLUSION

In conclusion this study was confirmed that farm location-source of productfrom agricultural of farmers was an important ($p<0.01$) for cultivating area, average yield, and average by-product. Farmers in MP district had highercultivating area, average yield, and average by-product from rice than corn, except for farmers from NP, and NT districts. The chemical composition of corn stover, corn foliage and rice straw consists of 6.32%, 3.10%, and 5.06% of crude protein, respectively.These findings suggested that, in addition to increase cultivating area, average yield, and average by-product from agricultural for utilization as roughage for ruminantlivestocks, which are different among farm location and source of product.

REFERENCES

Bal, M. A., Coors, J. G.& Shaver, R. D. (1997). Impact of the Maturity of Corn for Use as Silage in the Diets of Dairy Cows on Intake, Digestion, and Milk Production.Journal of Dairy Science 80(10), 2497–2503

BoonlomC., S. Yammuen-art, and Somkid P. 1999. Energy Values, In Vivo Digestibility and Dry Matter Intake of Rice Straw Determined by Regression Method in Dairy Cows and Sheep. In: Proceedings of the 37thKasetsart University Annual Conference, Animal, Veterinary Science. Bangkok, Thailand. Pp. 93-101.

Chirawat K., T. Phonbumrung, and C. Phaikaew.2009. Cattle Production and Feeding Management in Thailand. Department of Livestock Development, Thailand. 1-13 p.

Department of Livestock Development.2004. Nutritive Values Table of Animal Feedstuffs. Department of Livestock Development, Thailand. 37 p.

Li, H. Y., L. Xu,W. J. Liu, M. Q. Fang and N. Wang. 2014. Assessment of the Nutritive Value of Whole Corn Stover and Its Morphological Fractions.Asian Australas.J. Anim. Sci.27(2): 194-200.

Phitsanulok provincial agricultural extension office. 2015a. Information of cultivating area. Available: source: http://www.moac-info.net/Phitsanulok/index.php?option=com_wrapper&view=wrapper&Itemid=165.

Phitsanulok provincial agricultural extension office. 2015b. Information of cultivating area, total yield and average yield of rice and corn in Phitsanulok province. Phitsanulok province.

Phitsanulok provincial agricultural extension office. 2015c. Statistical and report of agricultural: Total land per cultivating area. Available: source: http://www.moac-info.net/Phitsanulok/index.php?option=com_wrapper&view=wrapper&Itemid=143.

Phitsanulok rice research center. 2014. Rice potential zoning in Phitsanulok province. Bureau of Rice Research and Development.Phitsanulok province.

Saowaluck Y., C. Boonlom, C. Boonserm and P. Somkid.1999. Digestibility and Enery of Rice Straw Evaluated by In Sacco and In Vitro Gas Production. In: Proceedings of the 37thKasetsart University Annual Conference, Animal, Veterinary Science. Bangkok, Thailand. pp. 163-171.

Saowaluck Y., C. Boonlom, C. Boonserm and P. Somkid.2000. Digestibility and Calculated net energy of sweet corn stover silage in dairy cows. In: Proceedings of the 38thKasetsart University Annual Conference, Animal, Veterinary Science. Bangkok, Thailand. pp. 76-85.

Sarnklong C., J.W. Cone, W. Pellikaan and W.H. Hendriks. 2010. Utilization of Rice Straw and Different Treatments to Improve Its Feed Value for Ruminants: A Review. Asian-Aust J. Anim. Sci. 23 (5): 680-692.

Sombong, S., P. Silman and W. Srinuch. 2007. Agro-industrial by-products as roughage source for beef cattle:Chemical composition, nutrient digestibility and energy values ofensiled sweet corn cob and husk with different levels of Ipil – Ipilleaves.Maejo International Journal of Science and Technology.88-94.

ThumrongC., S. Boonpradub and M. Aksornsawad. 2005. Enhancing Tield of Rainfed Maize in Phitsanulok Province. In: Proceedings of the 32thNational Corn and Sorghum Conference, Thailand. pp. 43-48.

Vatsana, S. 2008. Utilization of crops residue for animal feeding. Rajabhat Agric. 7(1): 57-65.

Wanapat, M., Pimpa, O., Petlum, A. & Boontao, U. (1997). Cassava hay: A new startegic feed for ruminants during the dry season. Livestock Research for Rural Developmant. 9(2),1-5.

Figures

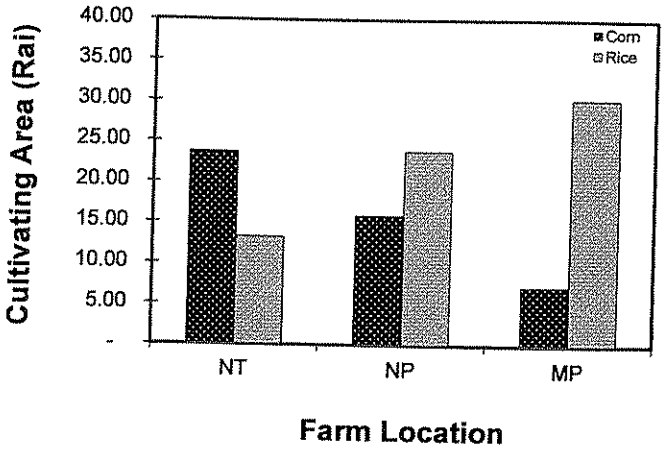

Figure 1 Leastsquaes means of cultivating area by farm location and source of agricultural production

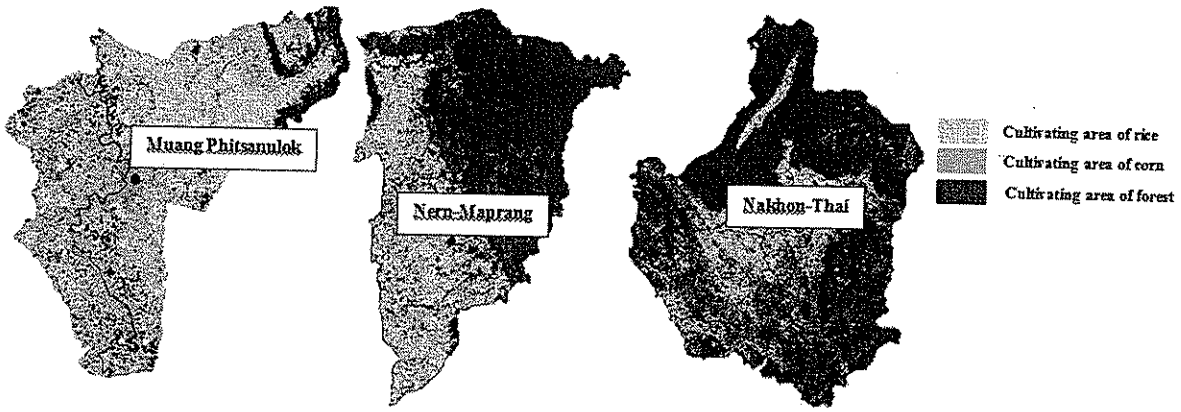

Figure 2. Information ofcultivating area for agricultural in MuangPhitsanulok, Nern-Maprang and Nakhon-Thai district at Phitsanulok Province

Source:Phitsanulok provincial agricultural extension office (2015a)

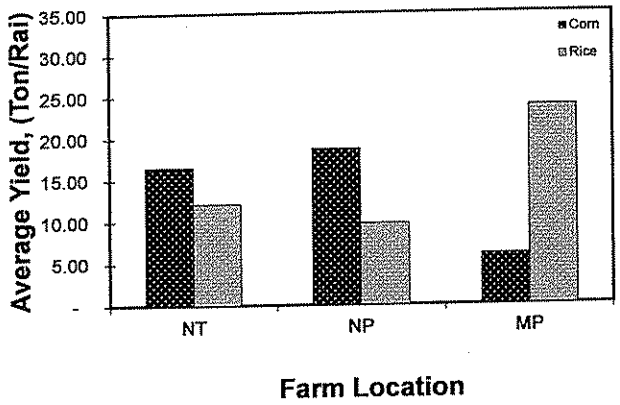

Figure 3.Leastsquaes means of average yield by farm location and source of agricultural production

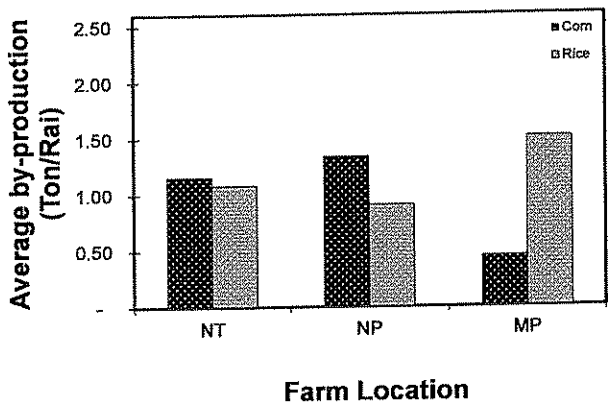

Figure4. Leastsquaes means of average by-product by farm location and source of agricultural production