

Abstracts

Technical Efficiency of Sustainable Broiler Production in Northern Thailand

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I. Abstract

Technical efficiency of sustainable broiler production showed the ability of broiler producers to maximize yields under the possible level of inputs. This study aimed to analyze the technical efficiency of sustainable broiler production in Northern Thailand and factors affecting the technical efficiency of sustainable broiler production in Northern Thailand. A secondary data of broiler industry for 17 provinces located in the north of Thailand was collected from 2015 to 2019. The collected data were theoretically analyzed using Super-efficiency Data Envelopment Analysis (SE-DEA) and Tobit regression. The results showed that all 17 provinces in Northern Thailand perform in technical efficiency differently. Lamphun Province showed the highest efficiency score at 3.93, while Phayao Province depicted the lowest technical efficiency score at 0.70. Furthermore, the factors affecting the technical efficiency of sustainable broiler production in Northern Thailand were the farmer's education levels, season, and farmer's age.

II. Results & Discussion

Technical efficiency of sustainable broiler production in Northern Thailand

The results of technical efficiency of sustainable broiler production in Northern Thailand with SE - DEA method found the average technical efficiency score is 1.31 during 2015 to 2019 which is at a very high level, and the technical efficiency score is greater than 1.00 due to the SE - DEA method. There are nine provinces or 52.93 percent of all provinces in Northern Thailand that the efficiency scores are greater than 1.00. Precisely, in the case of these six provinces; Lampang, Phare, Nan, Kamphaeng Phet, Phitsanulok, and Phichit, the efficiency score levels are 1.01 to 1.50, accounting for 35.29 percent. There is only one province, Nakorn Sawan, in which the efficiency score level is 1.51 to 2.00, accounting for 5.88 percent. Meanwhile, there are only Chiang Rai and Lamphun with the efficiency score level 2.51 to 3.00 and 3.01 to 3.50, respectively. The efficiency score level and the highest efficiency score show that Lamphun province had the highest efficiency score of 3.93. Eight provinces or 47.07 percent of all provinces in Northern Thailand had the efficiency score level of less than 1.00, divided into the efficiency score level of 0.9 to 0.99. There are two provinces, Mae Hong Son, and Uthai Thani, accounting for 11.77 percent. For the efficiency score level of 0.80 to 0.89, there are three provinces, Chiang Mai, Tak, and Phetchabun,

accounting for 17.65 percent. Finally, the efficiency score level was less than 0.80, there are three provinces, Phayao, Sukhothai, and Uttaradit with the least efficiency score at 0.70 of Phayao Province as in Table 1. However, the result found that provinces with an efficiency score level less than 0.80, did not indicate low efficiency because the least efficiency score (equal to 0.70) is still a high technical efficiency score level. The average efficiency score of all provinces in Northern Thailand greater than 1.00 indicated the high technical efficiency of sustainable broiler production in Northern Thailand as a whole. Lamphun Province has the highest technical efficiency in broiler production when compared with all provinces in Northern Thailand, resulted from the ability of broiler producers to maximize production under the possible level of inputs available. As such, the provinces in Northern Thailand have been successful in broiler production.

Table 1: Technical efficiency of sustainable broiler production in Northern Thailand during 2015 – 2019.

Efficiency score range	Number of provinces	Provinces	Percentage
< 0.80	3	PYO, STI, UTT	17.65
0.80 – 0.89	3	CMI, TAK, PNB	17.65
0.90 – 0.99	2	MSN, UTI	11.77
1.00	0	–	0.00
1.01 – 1.50	6	LPG, PRE, NAN, KPI, PLK, PCT	35.29
1.51 – 2.00	1	NSN	5.88
2.01 – 2.50	0	–	0.00
2.51 – 3.00	0	–	0.00
3.01 – 3.50	1	CRI	5.88
3.51 – 4.00	1	LPN	5.88
Mean		1.31	
Minimum		0.70	
Maximum		3.93	

Sources: From the results of the calculation

Factors affecting technical efficiency of sustainable broiler production in Northern Thailand

The study of factors affecting technical efficiency of broiler production in Northern Thailand with Tobit regression method found that three variables are affecting the technical efficiency of broiler production in Northern Thailand: 1) the farmer's education levels (EDU) at significance level 0.01 with the coefficient of 0.101867 which was the positive correlation. This suggests that with the higher education level, the technical efficiency of broiler production in Northern Thailand will be increased by 0.101867, 2) the season (SS) at the significant level 0.01 with the coefficient of 0.009425 which was the positive coefficient. This indicated that the higher the temperature, the

higher the technical efficiency of broiler production in Northern Thailand with 0.009425. 3) the farmer's age (AGE) at the significance level of 0.05 with the coefficient of 0.004311 which was the positive correlation means. This suggests that as the older farmer's age, the higher technical efficiency of broiler production in Northern Thailand with 0.004311 as found in Table 2.

Table 2: The results of factors affecting technical efficiency of sustainable broiler production in Northern Thailand.

Variable	Coefficient	p-value
Constant	0.002465	0.7441
Farmer's age (AGE)	0.004311**	0.0139
Gender of farmer (GEN)	0.001276	0.1782
Farmer's education levels (EDU)	0.101867***	0.0001
Number of households (HH)	0.035615	0.3531
Season (SS)	0.009425***	0.0020
Disturbance standard deviation	0.012127	0.0000
Log - likelihood function	50.88776	

Sources: From the results of the calculation

The results of factors affecting the technical efficiency of sustainable broiler production in Northern Thailand found that the farmer's age (AGE) affects the technical efficiency of broiler production in a positive correlation, which is consistent with the previous studies by Ali *et al.* (2014); Pakage *et al.* (2014). On the other hand, the studies by Ezeh *et al.* (2012); Todsadee *et al.* (2012); Ahiale *et al.* (2019) were found to be a negative correlation with the technical efficiency of broiler production in this study. Additionally, the farmer's education levels (EDU) affects the technical efficiency of broiler production in a positive correlation, which is in line with the studies by Begum *et al.* (2010); Ezeh *et al.* (2012); Ali *et al.* (2014); Zaman *et al.* (2018); Ahiale *et al.* (2019). However, the studies of Pakage *et al.* (2014); Ocholi and Ayila (2018) showed a negative correlation with the technical efficiency of broiler production.

III. Conclusions

The sustainable broiler production in Northern Thailand had technical efficiency at a very high level from 2015 to 2019. The results found that the average technical efficiency score was 1.31 and Lamphun Province had the highest technical efficiency score at 3.93. In addition, the lowest technical efficiency score was found in Phayao Province at 0.70, which suggests a high-efficiency level score. Moreover, three factors are affecting the technical efficiency of sustainable broiler production in Northern Thailand namely, the farmer's education levels (EDU), season (SS), and farmer's age (AGE) with significantly different levels.

IV. References

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