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Production Risks and Benefits Corn-Cow Integration System

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ABSTRACT: The data analysis used in this research is risk analysis, profit analysis and farming feasibility analysis. The corn-beef cattle integration system can provide great benefits, and a relatively small production risk. The risk of production in corn farming is greater than that of beef cattle (KV = 0.49<0.40). Meanwhile, the profit of corn farming is 10,027,029 IDR / season or 12,605,408 IDR / season / hectare with an R/C ratio of 3.12. The profit of the cattle business is 7,863,872 IDR / period or 1,669,831 / period / head with an R/C ratio of 1.25. So that the average profit of corn-cow integration farmers is 17,890,901 IDR.

KEYWORDS: Integration, risk, production, profits, corn, beef cattle

INTRODUCTION

The decline in the population of ruminants was caused by the increasing area of grazing land that was converted into food land, plantation land, and others. In addition, the smaller ownership of land for food crop production, which makes it impossible to raise livestock due to the insufficient availability of grass and agricultural waste products. Livestock in farming is considered important because it can support increased crop production through the use of manure. The concept of integration is a solution that will provide a synergistic advantage, that is, a multiple benefit obtained from the interaction between plants and livestock. Namely in the form of utilization of plant by-products (crop residues) for livestock and the use of livestock manure as organic fertilizer for plants which is integrated with the livestock (Directorate General of Animal Husbandry and Health, 2012).

Farmers' households in Indonesia have long been practicing integrated farming systems between crops and livestock, especially in rural areas. The characteristics found in these farmers are mixed farming. There are four models for the application of mixed farming systems, namely: 1) systems that are practiced naturally and from generation to generation by local farmers, 2) farming systems without involving livestock, 3) livestock farming systems, and 4) business systems based on land, labor, and capital resources. Each of these farming systems has risks and business uncertainty in the future. Some of the fundamental risks in the farming system are production risks, business and financial risks, and damage risks (Soedjana, 2007). One of the advantages of implementing a crop-livestock integration system is that it reduces the occurrence of business risks apart from diversifying the use of production resources and increasing production. This is obtained because of the synergy between activities, which in turn, almost no resources are wasted (zero waste). The implication is that some of the products produced can be obtained without the real cost of being paid by farmers or breeders (zero cost) (Devendra, 2009).

Bone Bolango regency is one of the areas selected to implement the crop-livestock integration system program (Directorate General of Animal Husbandry and Animal Health, 2012) which was chosen as one of the locations for the implementation of the program due to the potential for agriculture and livestock to become a development priority which is expected to increase economic growth. The main commodity cultivated by Bone Bolango people besides paddy fields is corn, where the waste can be used as cattle feed. The pattern of cattle development in Bone Bolango is in the form of an integration model of cattle with maize (Bappeda Gorontalo District, 2015). The development of cattle in Bone Bolango Regency is supported by a cow population of 28,350 heads in 2016 and a production and harvest area of 49,074 tons and 10,021 hectares of corn (BPS, 2017).

However, in reality there is no synergy between maize and cattle in Bone Bolango. Livestock manure has not been used as fertilizer for maize crops and corn plant waste has not been used as feed and concentrate for cattle, and has only been burned (Zubair, 2014). Likewise with the principle of implementation, the system of integration of maize with cattle that is implemented

is not in accordance with the established principles of implementation. In fact, Bone Bolango has a high potential for utilization of feed from agricultural waste, which is 2,471,770 tons compared to its feed needs of 439,884 and has an Agricultural Waste Carrying Capacity Index (IDDLP) of 5.62. This shows that this area is included in the very safe category for animal feed so that there is still a big chance of increasing the number of livestock (Rouf, 2014).

According to Gil, Garrett, and Berger (2016), an integrated system (IS) is determined by knowledge and supply chain infrastructure, which plays an important role especially in the early stages of IS, because it is close to the IS site and grain and livestock processing facilities. Siebold, and Berger, (2015) examined the adoption of different farmer-crop configurations in the integrated system, depending on their production strategy. Soedjana (2007) examined the crop-tenak integrated farming system as a response of farmers to risk factors. Fariyanti (2008) analyzes the economic behavior of vegetable farmer households in facing production risks and product prices in Pengalengan District. Kurniati (2012) examines the analysis of production risk and the factors that influence it on maize farming in Mempawah Hulu District, and Jahangir, etc (2020) examines farmers' perceptions and risk management in the Paddy-Shrimp integration system in Bangladesh. What distinguishes the above studies is that there are no studies that explain the crop-livestock integration model in terms of the level of profitability and risk of production.

The research objectives were to analyze the risk of production and the level of profit achieved by farmers in the corn-cow integration system in Bone Bolango Regency. This research is expected to produce a new concept in the perspective of an optimal crop-livestock integration model that is able to provide maximum farmer household benefits and minimum production risk.

METHODS

The research was conducted in Bone Bolango. The location was determined purposively with the consideration that the corn-cow integration system had been implemented in that location. The research lasted for 3 months, namely April-June 2020. The sampling technique used a census. The population in this study were all farmers who implemented the corn-cow integration system program in Bone Bolango Regency as many as 33 people.

The data used in this study are primary data and secondary data. Primary data in the form of cross section data from farmers were collected through direct interviews with sample farmers based on a list of questions. Secondary data comes from the Agriculture, Plantation, Animal Husbandry, Central Statistics Agency, District Offices, Village Offices, and other related agencies.

The data analysis used in this research is risk analysis, profit analysis and farming feasibility analysis. To determine the production risks and benefits of the corn-cattle integration business system using the formula :

***1. Production Risk*:** **CVa = Va/Ea**

Cva = Production Risk Coefficient of Variation

Va = Standard deviation of Farm production

Ea = Average Farm Production

2. Farming Profits: ***π = TR – TC***

Π = Profit

TR = Total revenue (IDR)

TC = Total Cost (IDR)

3. Eligibility: R / C = TR / TC

R / C> 1 farming is profitable and feasible to operate

R / C = 1 breakeven farm, no profit no loss

R / C <1 farm is detrimental and not feasible to operate

RESULTS AND DISCUSSION

A. Production Risk Analysis of Corn-Beef Cattle Integration

The existence of a production risk affects farmer behavior in making decisions. According to Muslim and Darwis (2012). The coefficient of variance (KV) represents fluctuation (deviation from the mean), wherein the fluctuation describes risk. The amount of production risk in the corn-beef cattle integration system can be seen in table 1.

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Table 1. Production Risks in the Corn-Beef Cattle Integration System in Bone Bolango.

Integration \Corn - beef	(Kg)	Corn waste (kg)	Cow (tail)	Cow waste (kg)
Average of production (Qi)	3,878	776	3	1,351
Standar deviation (V)	1,928.53	385.71	1.39	121.82
Variation (V^2)	3,719,223.48	148,768.93	1.94	148,768.93
Variation coefisient (KV)	0.49	0.49	0.40	0.09
Average KV = 0.36				

Table 1 shows the coefficient of variation (KV) of the risk of production in maize farming is greater than that of beef cattle (0.49 <0.40), which means that corn farming will experience greater risk in the future than that of cattle farming. This result is in line with the results of research by Prihtanti (2014), which shows that the coefficient of variation in the livestock business system is smaller than the farming system, both on the coefficient of variation in production and the coefficient of variation in profits, meaning that the risk faced by livestock businesses is smaller.

The production risk in corn-beef cattle integration tends to decrease from moderate to low. This is in line with the results of Imran's (2020) research which explains that the production risk in the corn-beef cattle integration system is better / lower than the risk of production in non-integrated farms even though there are more than one farming. In non-integrated farming, production failure in one farm can still be covered by other successful farms. But in the corn-beef cattle integration system, not only that, but even the failure of production in corn farming does not mean that corn does not provide benefits. However, this corn can still be used as beef cattle feed. This is similar to Musa's (2013) statement, that under certain conditions all crops can be given to livestock when corn cannot be harvested, for example during the long dry season. Corn plants at a certain age, especially when the ears begin to grow, have a high nutritional value for cows. At every harvest, the corn plant will produce waste as a byproduct, such as corn stalks, leaves, and corn stalks. If corn waste is processed properly as animal feed, it will practically increase the availability of high quality animal feed.

Likewise, the risk of production in the corn-beef cattle integration tends to decline from moderate to low. This is in line with the results of research by Altaf and Shah (2015) which explains that product diversification cannot provide benefits for the company if it runs separately, on the contrary they must be applied simultaneously in order to provide benefits for the company. Rugman (2015) in his research found that business diversification can reduce risks for companies.

According to Satoto et al., (2013) several efforts can be made to reduce the yield gap between seasons or periods, including knowing the prevalence of pest / disease attacks, mapping specific varieties, and applying specific cultivation techniques both in the rainy and dry seasons. For example, recommendations for fertilization, spacing, irrigation, and management of plant pests / diseases. Meanwhile, based on the land ownership status, it can be seen that the status of lowland rice farming with non-owned land has a higher risk compared to farming land on its own land. Apart from cultivating their own land, as long as the production capital and the offering of leased land are available, farmers also generally rent farming land. According to Saptana et al, (2010) this is one of the risk control strategies, because through the diversification of the spread of farmers it can also reduce the covariation of yield stretch and the variability of aggregate production. Likewise, if the location of the spread is spatially dispersed, the variability of aggregate production caused by site-specific impacts (eg pest infestation and local drought) can be minimized.

B. Advantages Analysis of Corn-Cattle Integration System

Farmers' profits in the corn-beef cattle integration system are obtained from the profits from corn farming plus the profits from beef cattle farming. Farming profits are obtained from the difference between revenue and total production costs. Revenue is all revenue generated during the season or during one period, namely from the amount of production sold multiplied by the selling price. Revenue is the value of the total product of the farming business within a certain period of time, both sold and not sold (Soekartawi, 1986), added by Soeharjo and Patong (1973) that revenue is the product of the multiplication of total production at the price per unit. Total production is the main and by-product, while the price is the price at the farm level or the selling price of the farmers.

1. Advantages of Corn Farming

Revenue from respondent farmers in corn farming is in the form of revenue from corn and corn waste. The average maize production of the respondent farmers was 3,878.78 kg with an average price of Rp 3,642 / kg in one planting season.

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Meanwhile, the average corn waste produced by farmers is 776 kg at a price of IDR 500 / kg. The production facilities for corn farming include seeds, fertilizers and medicines. The seeds used by most of the farmers are Bisi 2 and a small proportion who plant sweet corn. In general, the types of fertilizers used are Urea and Phonska fertilizers, while the types of medicines used are Klaris, Nokson, Dangke, Rambo, and Adengo, all in liters except Nokson in kilograms. The advantages of corn farming can be seen in Table 2.

Table 2. Advantages of Corn Farming in the Corn-Beef Cattle Integration System

No.	Explanation	Value (IDR)	Value (IDR/Ha)
1.	Receipts	**14,742,424**	**18,661,296**
2.	Cost	**4,715,395**	**5,968,854**
	a. Fixed cost	**161,455,8**	**204,373**
	depreciation of equipment	94,001.21	118,988,87
	Tax	67,454,55	85,385,51
	b.Variable cost	**4,553,939**	**5,764,479**
	Seedling	925.455	1,171,462
	Fertilizer	749,394	948,000
	Pesticide	412,879	522,631
	Labor	2,466,212	3,121,787
3.	Profit (1-2)	**10,027,029**	**12,692,441**
4.	R/C Ratio (1/2)	**3.12**	

Table 2 shows that maize farm revenues from maize and maize waste are IDR 14,742,424 or IDR 18,661,296 per hectare. The cost of corn farming consists of fixed costs (equipment depreciation and taxes) of IDR 161,455 or 203,373 per hectare. Meanwhile, the variable costs consist of seeds, fertilizers, pesticides and labor for IDR 4,553,939 or IDR 5,764,479 per hectare. Total costs were obtained from the sum of fixed costs and variable costs, so that the total cost of corn farming was IDR 4,715,395 or IDR 5,968,854 per hectare. The profit obtained from the difference between revenues and costs is IDR 10,027,029 or IDR 12,962,441 per hectare. This means that the benefits of maize farming from maize and corn waste are quite large.

Table 2 also shows the R / C Ratio value of corn farming of 3.12 > 1. This shows that corn farming is profitable and feasible to be cultivated. This value means that every cost incurred for corn farming is IDR. 1000, - then the income will increase by IDR 3,120.

2. Profits in Beef Cattle Business

In livestock business, the income of respondent farmers comes from selling cows and compost. In general, respondent farmers have a number of cattle ranging from 2-7 heads with the price of each cow depending on the age of the cow being sold. The ages of cows that are sold range from 1.6 years to 2.6 years, with prices ranging from IDR 7,000,000 to IDR 13,000,000 per head. Compost production ranges from 720 kg-1,800 kg and compost price is IDR 1,000 / kg. Compost production depends on the number of livestock owned. Beef cattle business revenue can be seen in Table 3.

Table 3. Beef Cattle Business Revenue in the Corn-Beef Cattle Integration System

	Scale enterprises (tail)	Value of sale of livestock (IDR)	Compost sales value (IDR)	otal receipts (IDR)	tal receipts (IDR/tail)
L.	2-3	24,000,000	942,857	24,942,857	9,785,238
2.	4-5	39,062,500	1,665,000	40,727,500	9,304,375
3.	6-7	48,875,000	2,160,000	51,035,000	8,183,452

Table 3 shows the revenue from the beef cattle business sourced from the sale value of livestock and the sale of compost. The largest revenue per period per farmer is on a business scale of 6-7 individuals, namely IDR 51,035,000, while the smallest is a business scale of 2-3 individuals, namely IDR 24,942,857. Total revenue has increased along with the increase in the scale of the farmer's business. The larger the scale of the business, the greater the revenue received by the farmer.

Total Revenue per head in Table 3 shows that the largest total revenue is on a 2-3 business scale (Rp. 9,875,238 per head) while the lowest total revenue is on a scale of 6-7 heads (Rp. 8,183,452). . The total revenue per head on a business scale of 4-5 heads and 6-7 heads is lower than the revenue per head of a business scale of 2-3 heads, this is due to the income obtained on a

business scale of 4-5 heads and 6-7 heads selling per head is slightly lower than other business scales, so that the income per head is less than other business scales.

Production costs are costs incurred by farmers in farming activities that they run for one season or period. Costs are divided into two types, namely fixed costs and variable costs. Fixed costs are costs that do not depend on the size or size of the output. This cost will still be incurred even if the results of the production obtained are many or less. Fixed costs incurred in the corn-cow crop integration system include depreciation of equipment for cattle farming. Fixed costs of beef cattle business can be seen in Table 4.

Table 4. Fixed Costs of Beef Cattle Business in the Corn-Beef Cattle Integration System.

No	Scale enterprises (tail)	Total fixed cost (IDR/Period)	Total fixed cost (IDR/tail)
1.	2-3	141,658	55,580
2.	4-5	304,156	66,928
3.	6-7	180,188	28,838

Table 4 shows the fixed costs of a beef cattle business consisting only of equipment depreciation costs. The total fixed cost per period per farmer from beef cattle business is highest on a business scale of 4-5 heads, namely Rp. 304,156 and the lowest on a business scale of 6-7 heads, namely Rp. 28,838. Likewise with fixed costs per head, the highest cost was on a scale of 4-5 birds (Rp.66,928) and the lowest was on a scale of 6-7 birds (Rp. 28,838). This is due to the fact that the completeness of the equipment used in managing the beef cattle business run on a business scale of 4-5 heads is more complete than other business scales, the more complete the equipment owned, the greater the costs incurred to buy the equipment.

Variable costs are costs that are variable or not fixed according to the amount of production or costs that must be incurred in a large business depending on the amount of production achieved. As for the cattle business, variable costs are in the form of feeder costs for cattle, feed, labor, vitamins and medicines. In general, feeder cows belonging to the respondent farmers are between 1-2 years old. The feed is in the form of fresh ingredients and dry ingredients. Fresh ingredients come from elephant grass and dry ingredients in the form of bran and corn waste. The daily wages of labor in Bone Bolango District range from Rp 50,000 to Rp 60,000. The types of vitamins used are in the form of complex B, B12 and B plex, while the drug used is a worm medicine under the brand Sanbe. The variable costs of beef cattle business can be seen in Table 5.

Table 5.Variable Costs of Beef Cattle Business in the Corn-Beef Cattle Integration System.

No	Scale enterprises (tail)	Cow Bakalan (IDR)	Feed (Rp)	Labor (IDR)	Vitamin and drug IDR	Compost (IDR)	Total variable cost (IDR)	Total variable cost (IDR/tail)
1.	2-3	14,380,592	4,007,143	5,400,000	43,714	261,429	21,213,238	8,377,929
2.	4-5	24,652,500	4,387,500	2,520,000	51,750	411,429	32,383,179	7,411,625
3.	6-7	32,500,000	3,262,500	2,520,000	64,000	540,000	38,886,500	6,232,673

Table 5 shows the variable costs of livestock business consisting of feeder cattle, feed, labor, vitamins and medicines as well as the cost of composting. The largest variable cost per period was on a business scale of 6-7 individuals, namely Rp. 38,886,500, while the 2-3 business scale had the least variable cost, namely Rp. 21,213,238. This occurs because there are differences in the number of livestock ownership, the more livestock owned, the more costs are spent on buying feeder cattle, feed, vitamins and medicines. The total cost of beef cattle farmers can be seen in Table 6.

Table 6.Total Beef Cattle Business Costs in the Corn-Beef Cattle Integration System

No	Scale enterprises (tail)	Total fixed Cost (IDR)	Total variable cost (IDR)	Total production cost (IDR)	Total Biaya Produksi (IDR/tail)
1.	2-3	141,658	21,213,238	21,354,896	8,443,509
2.	4-5	304,156	32,388,000	32,692,156	7,478,553
3.	6-7	180,188	38,886,500	39,066,688	6,261,510

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Table 6 shows the total cost of beef cattle business obtained from the sum of fixed costs and variable costs. The highest cost of beef cattle business per period is on a business scale of 6-7 heads, namely Rp. 39,066,688, - while the lowest cost is on business scale of 2-3 cows or Rp. 21,354,896. This is because the business scale of 6-7 heads has the largest number of livestock, while the business scale of 2-3 has the least number of livestock. The larger the business scale, the greater the total cost required by the farmer. However, the business scale of 6-7 heads has the lowest total cost of beef cattle per cow compared to other business scales. This is because the cost of feeder cattle per head on a business scale of 6-7 heads is lower than other business scales so that the total cost per head obtained is less than other business scales.

Profit is the difference between total revenue and total production costs (costs incurred) in doing a business. If the revenue earned is less than the costs incurred for production, the result is negative or loss, but if the revenue incurred is greater than the cost, the result is positive or profitable. The profit of beef cattle business can be seen in Table 7.

Table 7. Benefits of Beef Cattle Business in the Corn-Beef Cattle Integration System.

No	Scale enterprises (tail)	Total receipt (IDR)	Total cost (IDR)	Profit (IDR)	Profit (IDR/tail)	R/C Ratio
1.	2-3	24,942,857	21,354,896	3,587,961	1,351,730	1.14
2.	4-5	40,727,500	32,692,156	8,053,344	1,825,822	1.25
3.	6-7	51,035,000	39,066,688	11,968,313	1,921,942	1.31

Table 7 shows the profits from the beef cattle business obtained from the difference between revenue and cost. The largest profit per period was on a business scale of 6-7 heads, namely Rp. 11,968,313 and the smallest on a business scale of 2-3 individuals, namely Rp. 3,587,961. This is because on a business scale of 6-7 heads have the largest number of livestock compared to other business scales, on the other hand, on a business scale of 2-3 heads have the least number of livestock. The difference in profits obtained by breeders is due to differences in the scale of the beef cattle business. The larger the scale of the farmer's business, the greater the profit per head he will get. This is supported by Amin's opinion (2012) that the difference in profits obtained by different breeders is due to differences in the number of beef cattle population owned by farmers-breeders.

Table 7 shows that the largest R / C Ratio value is on a business scale of 6-7 heads with an R / C ratio value of 1.31 > 1. This shows that the beef cattle business is profitable and feasible to be cultivated. This means that every expense incurred for a beef cattle business is Rp. 1000, - then the income will increase by Rp. 1,310. It can also be seen that on a scale of 2-3 and 4-5 the value of the R / C ratio is more than 1, which means that on this business scale the beef cattle business is profitable and feasible to work on.

3. Benefits of Corn-Beef Cattle Integration Business

The accumulation of corn farming and beef cattle business can provide revenue, costs and benefits for the integration of corn-beef cattle farmers in Bone Bolango Regency which can be seen in Table 8.

Table 8. Average Revenue of Farmers in the Corn-Beef Cattle Integration System

No.	Commodity	Total receipt (IDR)	Total receipt /Ha/tail (IDR)
1	Corn (Rp/season)	14,742,424	18,661,297
2	Beef (Rp/period)	38,901,786	9,091,022
Total		53,644,210	27,752,318

Based on Table 8, it can be seen the amount of revenue from corn farming and beef cattle business. The source of revenue from corn farming comes from maize production and maize waste production, where the amount of maize farm revenue is obtained from multiplying the price of maize with the amount of production per planting season (6 months) and the amount of revenue from corn waste is obtained from multiplying the price of corn waste by the amount of waste production maize per planting season with an average land area of 0.79 Ha. The average income from maize farming is IDR 14,742,424 / season. Meanwhile, revenue from cattle comes from sales of cows and cow waste (compost), which are sold for one (1) period (6 months), which is

an average of Rp. 38,901,786. Only the total income of farmers in the Corn-Cattle Integration system is Rp. IDR 53,644,210. While the total cost of corn-beef cattle integration can be seen in Table 9.

Table 9.Average Variable and Fixed Costs in the Corn-Beef Cattle Integration System

No	Commodity	Total cost (Rp)		Total production cost (IDR)	Total Production cost /Ha/tail (IDR)
		Fixed cost	Variable cost		
1	Corn (Rp/season)	161,455	4,553,939	4,715,395	5,968,855
2	Beef (Rp/Period)	208,667	30,829,246	31,037,913	7,391,191
Total Production cost (Rp)		**370,122**	**35,383,785**	**35,753,308**	**13,360,046**

In Table 9, it can be seen that the variable cost of corn farming is IDR 4,553,939 / season and the fixed cost is IDR 161,455 / season so that the total cost of corn farming is IDR 4,715,395 / season. Whereas in beef cattle business, variable costs are IDR 30,829,246 / period and fixed costs IDR 208,667 / period, so that the total cost of beef cattle business is IDR 31,037,913 / period. The total production cost in the corn-cattle crop integration system is IDR 35,753,308.

The benefits of corn-cattle integration farmers in Gorontalo District are obtained from the income from the business of the corn-cattle integration system minus the total costs incurred during one season. The advantages can be seen in Table 10.

Table 10. Average Profit of Corn-Beef Cattle Farmer's Profit per Season / Period.

No	Commodity	Total profit (IDR)	Total profit /Ha/tail (IDR)	R/C Ratio
1	Corn (Rp/season)	10,027,029	12,605,408	3.12
2	Beef cattle (Rp/period)	7,863,872	1,699,831	1.25
Total		**17.890.901**	**14,305,239**	**1.5**

Table 10 shows the profit of corn farming as much as IDR 10,027,029 / season or IDR 12,605,408 / season / hectare. Meanwhile, the profit of cattle farming is IDR 7,863,872 / period or 1,669,831 / period / head. So that the average profit of corn-cow integration farmers is IDR 17,890,901.

Table 10 also shows that the R / C Ratio value of corn farming is greater than that of beef cattle (3.12 > 1.25). However, the R / C ratio of maize farming (3.12) and beef cattle business (1.25) is more than 1. This shows that both maize and beef cattle are profitable and feasible to be cultivated. This means that in corn farming, every cost incurred is IDR 1,000, - it will increase the revenue by IDR 3,120 and in the beef cattle business, every cost incurred is Rp. 1,000 then the revenue will increase by IDR 1,250.

The value of R / C ratio in the corn-beef cattle integration system is 1.5 > 1. Which means that the integration system is profitable and worth working on. This also shows that the corn-beef cattle integration system is more profitable than the beef cattle business because the R / C ratio is higher. The value of R / C Ratio 1.5 shows that each cost incurred in the corn-beef cattle integration system is Rp. 1,000 will result in an income of IDR 1,500.

Based on the description above, it can be seen that the corn - beef cattle integration system can provide large benefits, and relatively small production risks. This is in line with research conducted by Bahri., Et.al (2018), which states that the benefits obtained from integrated farming are greater than that of maize farming or beef cattle farming. If farming only focuses on corn crop farming, the profit is only IDR 5,121,875 / month and if you only focus on 12 beef cattle, the profit is IDR 11,236,500 / month. Meanwhile, the integration gain reaches IDR 16,299,000 / month.

Meanwhile, the profit of non-integrated beef cattle business is small compared to integrated ones, as the results of research by Hastang and Asnawi (2014) state that the profits obtained by smallholder-based beef cattle breeders in Bone Regency on an average maintenance scale of 5.6 heads are Rp. 2,663,519 / farmer / year or IDR 474,291 / head / year. The business is feasible to run as seen from the value of the R / C ratio is 1.11> 1. Therefore it is also in line with previous research on the integration of livestock crops which explains that the implementation of the integration system can help farmers to increase their profits (Asmara 2002, Howara 2004 and Elly et.al, 2008).

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It is also supported by research by Imran., et al. (2018), that the crop-livestock farmer group has a higher profit on corn farming compared to the profit of non-integrated maize farmer groups. This is due to the fact that the total corn production of the integrated farmer group increased by 22% compared to the non-integration farmer group. due to the impact of fertilization, where integrated farmers use organic fertilizer from cow dung for corn plants. At every harvest, the corn plant will produce waste as a byproduct, such as corn stalks, leaves, and corn stalks. If corn waste is processed properly as animal feed, it will practically increase the availability of high quality animal feed. In certain conditions the entire crop can be given to livestock when the corn cannot be harvested, for example during the long dry season.

Meanwhile, the use of inorganic fertilizer for the integrated farmer group was lower (decreased by 30%) compared to the non-integrated group of maize farmers who did not use organic fertilizer from cows. The profit of corn farming and the R / C value of integrated farmers is higher than that of non-integrated farmers, namely IDR 11,468,605 / ha and an R / C ratio of 2.81 (Imran, .et.al, 2018). Furthermore, Siahaan (2018) adds that other factors that cause differences in the components of the production cost of organic and non-organic farming are the types of fertilizers and medicines used. In non-organic farming, farmers use chemical fertilizers, such as Urea, SP-36, Phonska, KCl, ZA and TSP as well as chemical drugs which are relatively high in price. The average cost of fertilizers and chemical drugs incurred by non-organic farmers per one planting season was 13.09% and 3.9% of the total average cost of IDR 12,613,482. In other words, the total average cost that must be incurred by non-organic farmers in providing fertilizers and chemical drugs per one planting season is 17.00% of the total average cost per 1 Ha.

CONCLUSION

The risk of production in corn farming is greater than that of beef cattle (KV = 0.49 < 0.40), which means that corn farming will experience a greater risk in the future than cattle farming. Meanwhile, the profit of corn farming is IDR 10,027,029 / season or IDR 12,605,408 / season / hectare with an R / C ratio of 3.12. The profit of the cattle business is IDR 7,863,872 / period or 1,669,831 / period / head with an R / C ratio of 1.25. So that the average profit of corn-cow integration farmers is IDR 17,890,901. The value of R / C ratio in the corn-beef cattle integration system is 1.5> 1. Which means that the integration system is profitable and worth working on. This also shows that the corn-beef cattle integration system is more profitable than the beef cattle business (R / C Ratio = 1.25) because the R / C ratio is greater. The value of R / C ratio of 1.5 shows that each cost incurred in the corn-beef cattle integration system is IDR 1,000, which will result in an income of IDR 1,500.

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