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The Farmer's Perception on Crop By-Product Utilization as Feed for Beef Cattle in Bulukumba Regency, South Sulawesi, Indonesia

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Authors' contributions

This work was carried out in collaboration between all authors. Author AA designed the study, wrote the first draft of the manuscript and edited the paper after peer-review. Authors HMA and JAS administer the questionnaire, managed the analysis of the study. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aims: This research was objected to analyze farmers' perception on feeding technology and crop by-product utilization at the farms of Bulukumba regency, Souh Sulawesi Indonesia.
Place and Duration of Study: The number of respondents involved was as many as 96 farmers in the two sub-sites (Herlang District and Bulukumpa District), Bulukumba Regency South Sulawesi, between May until August 2011
Methodology: Data was collected by oobservation, interview on the basis of questionnaires and focus group discussion (FGD). The collected data were then analyzed in a statistic descriptive method.
Result: The research results indicated that most of cattle were still maintained traditionally (53.12%), of letting the cattle go all day (28.83%), and letting the cattle all noon then tying them at night (32.29%). The number of farmers stalling their cattle was

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low 46.87% (44 farmers), their cattle just at night (semi-intensive) were 31 farmers, and the one stalling their cattle all days (intensive) were 14 farmers or 12.12% from all respondents. A large number of farmers (88.54%) to feed in rice fields, gardens, and yards, while others to the herding fields 11.46%. The utilization of crop by-product as beef cattle feeding in farmer stills low that was 55.21% of farmers did not use crop by-product as beef cattle feeding. The farmers knew about feeding technology 56.25%, such as ammoniation, hay, silage, and other fermentation technology. Applying level still low that was 24.07%. The farmer's perception on feeding technology and crop by product utilization relatively still low caused by limited knowledge.

Conclusion: The crop by product utilization as beef cattle feed in Bulukumba Regency is still low. The farmer know about feed technology such as hay ammoniation, fermentation, and silage technology but it less in applying by considering that the availability of natural grasses is still enough for cattle, feed technology is not effective, and cost of cultivation is still high.

Keywords: Perception; crop by-product; feed technology; beef cattle.

1. INTRODUCTION

The role of animal husbandry sector becomes more important by added population, urbanization, rising population income and awareness' of nutrients balance. Now days, animal husbandry development especially ruminant cattle are expected to be able to become one of development locomotive particularly in supplying animal protein sources of meat and milk to increase public food consumption. Nevertheless, most of the rural-based farmers develop small farm-scale type. On the other hand, the successes of animal husbandry are determined by some factors, one of them is feeding factor. Feed is very influential to animal husbandry exertions development because about 70% from production cost of animal husbandry exertion are feeding cost. Continuing feeding availability in good quality and sufficient quantity becomes decisive factor of successful of animal husbandry.

Animal husbandry development really depends on district development. Bulukumba Regency is one of regency in South Sulawesi, Indonesia that potential for animal husbandry development. Based on animal husbandry statistical data in 2010, Bulukumba regency is the fourth of the largest cattle producer regency in South Sulawesi namely 81,232 cows or 9.57% of total population in South Sulawesi [1]. Besides farming, this regency produces various crops. As illustration, in 2010 Bulukumba regency was included as the second of the largest peanuts' producer (8.622tons) and the fourth of the largest corns' producer (12.026 tons) in South Sulawesi. Other products are rice, sweet potato, cassava, soybean and green bean 245.185 tons, sweet potato 2.70 tons, cassava 20.147 tons, soybean 165 tons, and green bean 145 tons respectively.

Particularly for beef cattle, forage is the main food source. Common forage was given for cattle are grasses from herding fields or meadow, dry fields, bunds, and outskirt of streets. Some constraint of forage availability are the changing land function that before as forage sources becomes settlement terrains and industrial parks thus herding plant fields as forage sources decrease. Besides that, forage availability also depend on seasons, where during in rainy season forage productions are high and during in dry season forage productions are low [2].

One effort to solve the limitation of forage sources to fill forage supply for beef cattle is by crop-product utilization. The wider crop fields make harvest fields wide increasing, thus crop by-product production increases. Therefore, crop by-product utilization is an appropriate alternative as feed source for beef cattle with feed technological contact. However with or without technological utilization, related to user perception on that technology perception is experiences about objects, events or relations that are got by concluding information and appraise messages (technology). The objective of this study was to know farmers' perception on crop by-product utilization and feed technology as beef cattle feed.

2. MATERIALS AND METHODS

To analyze farmers' perception on crop by-product utilization and feed technology as beef cattle feed was made by survey method by interviewing farmers (respondents). Interview used structured questionnaires with opened and closed answer. The research was performed in location (district) based on density cattle area. Cattle density based on farming land is assumed that in density location category then cattle competition level to forage (feed) is very high, and the other way on medium/rare availability category of forage (feed) is more available. Regency location in density category is Herlang District and medium/rare category is Bulukumpa District. Thus, both of the districts were selected as the sampling location in this research.

This research used random sampling [3]. The number of respondents involved was as many as 96 farmers in the two sub-sites (Herlang District and Bulukumpa District). To discover deeper information, *focus group discussion* with farmers was performed. On the other hand, in-depth interviews are also performed (in-depth study) to several key informants like the chairman of farmer groups and agricultural extension. The primary data extracted from farmer respondents was including respondent's characteristics as age, education, breeding experience, feed management aspect that is feeding system, types of feed, using feed supplement, feed availability, and crop by-product utilization, and using feed technology. Evaluated survey data result of crop by-product utilization as ruminant cattle feed was analyzed in descriptive statistics, with data tabulation, data conversion, data distribution, and processed by using SPSS version 12.0.1.

3. RESULTS AND DISCUSSION

According to the result research, general condition may be know about farmer respondent i.e. farmer's age, educational level, main job, and breeding experiences, as observed in Table 1. Farmer's age was one factor that influenced income and economic efficiency. Farmers age as labour on farm operations in rural area often become determining large or small of income [4]. If we inspected from respondents' age characteristic, most farmers are in productive age category between 21 to 50 years old or 77.08%, while farmers are in above 50 years old as many as 22.92%. The younger farmer's age (productive age 20 to 45 years old), generally the higher curiosity feeling towards something and more interest in adapting to the introduction of higher technology [5].

Table 1. Farmers Respondent General Condition

Description	Total	
	Respondent (People)	%
Education Level		
Not Pass Elementary School	25	26.04
Elementary School	29	30.21
Junior High School	25	26.04
Senior High School	16	16.67
University Graduate	1	1.04
Main Job		
Farmer	80	83.33
Employee	4	4.17
Pension	1	1.04
Trader	8	8.33
Housewife	3	3.13
Ages Level (Years)		
<20	0	0.00
21-30	6	6.25
31-40	25	26.04
41-50	43	44.79
>50	22	22.92
Farming Experiment (Years)		
<10	19	19.79
10–20	57	59.38
21–30	16	16.67
>30	4	4.17

Education is an important factor to expand farmer's resources. Education will increase knowledge and skills thus improve work productivity that will determine successfulness of work. This research indicated that average education level of most farmers (56.25%) is elementary school and junior high school, while farmers who passed their secondary school as many as 16.67% and only 1.04% who passed in a university. However, total respondent who failed to complete their elementary school as many as 26.04%. Low education levels can be assumed that the farmers' ability to adopt a skill for the development of livestock will experience obstacles and difficulties. The level of education immense influence on the absorption of new ideas, because the influence of education on a person will give a broad insight, so that farmers do not have a nature that is not too traditional [6]. The higher education level of farmers, the higher the quality of human resources, which in turn will be the higher the productivity of the work done. So the level of education is one aspect that affects a person's mindset in determining the decision to receive a new innovation, because the higher the expected level of education a person can think better and easier to absorb agricultural innovations associated with the development of farming [7].

Respondents' jobs were dominated as a farmer that is 83.33%. Other respondents work as a trader, employee, and pension that are respectively 8.33%, 4.17%, and 1.04%. The interesting thing to propose is women (housewife) involved to manage farm cattle operation that is 3.13%. Commonly rural residents devoted their attention to their main work i.e. as a farmer so most of their farm operation is made as part time work thus the maintenance of their cattle become less.

Research result Table 1 shows that most farmers (76.05%) farming experiences are between 10 to 30 years. The experiences were obtained from their parents from generation to generations. With breeding skill that possessed, farmer's knowledge, farmer's attitude and skill on reproduction aspect, feeding, maintenance management make farm cattle operation management become better. Cattle maintenance system in Bulukumba regency was 64.58% respondent farmers who let go of their cattle in the noon and tie them up at night, as well as stall their cattle just at night.14.58% remain farmers stall their cattle all day and let go of their cattle during the day (20.83%). Farmers who choose to let go their cattle during the day having perception that their cattle security is more guaranteed if they are released separately, including at night, instead of stalling them. The reasons that cattle stalled at night are considered from the security side (cattle robbing) will be easier and the number of cattle robbed will be more because they are concentrated in one place (stall). On the other hand, farmers who stall their cattle all day long (intensively) have a reason that it will be easier for feeding. While who stall their cattle only at night have a reason in security side. Farmers' perception in looking and anticipating the cattle robbing risk is different, but each farmer is confident with his maintenance system.

The cattle management system which mentioned above is really influenced toward feeding management aspects. Cattle are let go by the owner have a chance to be feed such as from grass in rice fields, gardens, and yards, or herding fields. Farmers who give feed their cattle with gather grass in rice fields/yards are 31.29%. Most giving feeding system done by farmers are gather grass in rice fields, gardens and yards, and giving grasses (56.25%) and gather grass in herding fields only 11.46% Table 2. Fewer farmers do cattle herding because herding fields location are far, also the cattle uncertainly get the grass they like. It shows that produce fields such as rice fields and gardens become ecological basis for cattle as forage supplier and place for maintaining cattle, during herbing fields were indicated reduced, those are showed by lees farmer who release their cattle in herbing fields. There is tendency in forage availability in herbing fields is limited and far from rural areas (Setiadi et. al*.* 1995). The indicates that farmers tend to raise their cattle traditionally and naturally. This is affected by their jobs, those are not only as a farmer but sometimes also as a farmer in rainy season/planting season, thus breeding cattle intensively failed to be optimal. Farmers just tend to use grasses because easier to give to cattle. As using leaves and crop by-product, is consider difficult to provide.

Additional feed is given by farmer are bran, concentrates, salt, rice bran and salt, and minerals. Additional feed like bran is the most widely used by farmers (60.41%). Besides using bran, other additional feed supplement used was salt. Farmers usually also give mixed additional feed with other feed such as grasses. Concentrate and minerals are not used as feed by respondents surveyed, beside expensive, cattle prefer to be given just by bran or salt. On the other hand, to provide fodder, farmers take four ways such as growing grasses, growing legume, growing grasses and legume, also preserving forage (hay, silage, ammoniation, etc). However, 57.29% farmers said that availability of fodder is seasonal, where during in dry season forage is not/less available.

The crop by-product utilization as beef cattle feed in Bulukumba Regency is still low. It can be shown from 96 total respondents from two districts surveyed, many farmers did not use crop by-product as beef cattle feed namely 55.21% from total respondents, and as many as 44.79% respondents used crop by-product as beef cattle feed. Crop by-product or in this case crop by-product is not used as feed, farmers gave several perceptions such as a) considering that natural grasses are still available to provide their cattle, b) after harvest, especially rice, rice fields are cleaned immediately because replanting will be done mainly on

intensive agriculture pattern thus rice straw is burned, c) difficulty to collect and carry rice straw to houses (settlements), because rice fields are far away from their house.

Different with farmers who used crop by-product as cattle feed,(44.79% farmers), gave perceptions for crop by-product utilization as feed i.e. a) crop by-product can be used as an alternative feed sources, especially if forage is not available, particularly in dry season, b) crop by-product can be used as feed stocks by storage. Storage method performed is still classified as conventional one by store/stack it in cellar.

Table 2. Cattle Maintenance System and Feeding

Description	Total	
	Respondent (People)	%
Cattle Maintenances Method		
Letting go of throughout the day	20	20.83
Letting go of during the day and tying up at night	31	32.29
Stalled all day	14	14.58
Stalled at night	31	32.29
Feeding System		
Grazing at rice field/yard	31	32.29
Grazing at herding field	11	11.46
Grazing at rice field, garden, yard and giving grasses deduction	54	56.25
Types of feed forage given		
Just Grasses	42	43.75
Grasses and leaves	11	11.46
Grasses and crop by-product	31	32.29
Grasses, leaves, and crop by-product	12	12.50
Types of adding feed given		
Bran	41	42.17
Salt	19	19.79
Bran and Salt	17	17.71
Without any adding feed	19	19.79
Feeding availability all year		
Always available	41	42.71
Fluctuated/seasonal	55	57.29

Table 3 shows that from several farmers who use crop by-product as feed, mainly use rice straw, corn straw, and soybean hay as respectively 28, 26, and 27 respondents. Most farmers used rice straw and corn straw as feed compared with other crop by-product caused by the amount of those crop by-products was higher than the others. Besides using rice straw, corn straw, and soybean hay, other crop by-product was used as cattle feed. The number of respondent who use peanut hay, green bean hay, sweet potato straw, and cassava shoot were respectively 18.60%, 11.63%, 16.28%, and 11.63% from total respondents.

Table 3. Crop by-product utilization

Description	Total	
	Respondent (People)	%
Crop by-product utilization as feed		
Using	43	44.79
Not Using	53	55.21
Kinds of Crop by-product are used		
Rice straw	28	65.12
Corn straw	26	60.47
Soybean hay	27	62.79
Peanut hay	8	18.60
Green bean hay	5	11.63
Sweet potato straw	7	16.28
Cassava Shoot	5	11.63
Agriculture wastes are used as feed all time		
Used all time	9	20.93
Not used all time	34	79.07
Knowledge about crop by-product feed technology		
Know	54	56.25
Not know	42	43.75
Types of feed technology are known		
Ammoniation/other fermentations	27	50.00
Silage	1	1.85
Hay (drainage)	13	24.07
Ammoniation/other fermentations, silage	0	0.00
Silage, hay	1	1.85
Ammoniation/other fermentations, hay	7	12.96
Ammoniation/other fermentations, Silage, hay	5	9.26
Applying/perform feed technology		
Apply/perform	13	2.07
Not apply/perform	41	75.93

Related to the feed technology, Table 3 shows that 54 respondents or 56.25% know about feed technology and the remaining do not know. Farmers know about feed technology from various sources such as training, guiding, and demonstration from animal husbandry department agents or other institutions, as well as from electronic media. Technology types that known by farmers are ammoniation, or other fermentation which reached 50% farmers. However, those who are aware of feed technology only 24.07% who adopt the technology.

Less number of farmer who adopt the feed technology, were caused by some following farmer's perceptions on feed technology. Farmer believes that natural grasses forage is still available so that crop by-product utilization is not necessary, Farmer considers that feed technology is not effective to perform because requires outpouring time (wasting time), such as in collect and carry crop waste, and in process making. In adopting feed technology, it requires materials and tools, such as in ammoniation and silage require silo/place storage, and other materials like adding urea so that give consequence to additional cost. Farmer is less understood that feed technology may increase crop waste quality as feed so that can

increase cattle production. Without doing any feed technology, crop waste is still can be consumed by cattle.

According to the result presented above, so the effort that can be made to increase crop by-product utilization and feed technology as beef cattle feeding requires following policies steps:

a. Policies synergy between agriculture sector and animal husbandry sector on the same understanding that crop wastages are great potency to be used as feed cattle. Thus, an integrated agricultural program development is necessary to proclaimed such as development of agriculture and animal husbandry integrated pattern, for example the integration of rice-beef cattle. In order to that, technical orientation on development area of beef cattle with rice integration pattern are necessary, as well as mapping and determining of beef cattle-rice integrated pattern area location which appropriate with geographic and population condition.
b. For policy maker (government), it is to develop a program to encourage the optimality of crop by-product utilization as beef cattle feeding in farmers level/field. It is quite reasonable to be conducted by observing the number of farmer who used crop waste is still low.
c. The farmer who knows about feed technology is high enough, but adopting the feed technology level is still low. To manifest it, government needs to facilitate infrastructure and facility required on crop by-product utilization as feed such as building silos or feed storage on farmer levels/farmer groups, and provides materials/tools required on adopting feed technology.
d. Improvement of farmer's knowledge and skill about the benefits of the application of feed technology are needed. Steps to be taken are to perform feed technology application technical guidance, determine feed waste technology that appropriate with local agro-ecosystem, and arrange feed technology application technical orientation for each agricultural waste.
e. Feed technology application can work well if related stakeholders have same perceptions. According to Soetanto (2001), all this time one of cause's adoption levels of innovation on feed technology is low caused by different perception between farmers and researchers as technology producer. The different perception is researchers consider that the existing feed technology is simple technology, easy and cheap. Than farmers consider that apply the feed technology, require inputs and tools to make, and adding cost.

4. CONCLUSION

According to the results and discussion, this can be concluded that the crop by-product utilization as beef cattle feed in Bulukumba Regency is still low. The farmer know about feed technology such as hay ammoniation, fermentation, and silage technology but it less in applying by considering that the availability of natural grasses is still enough for cattle, feed technology is not effective, and cost of cultivation is still high. The need of program to encourage the optimality of crop by-product utilization as beef cattle feeding in farmers level/field and to facilitate infrastructure and facility required on crop by-product utilization as feed such as building silos or feed storage on farmer levels/farmer groups, and provides materials/tools required on adopting feed technology.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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