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Farmer Satisfaction on Concentrate Feed Produced by Dairy Feed Mill Cooperative

Kepuasan Peternak pada Pakan Konsentrat yang Diproduksi oleh Pabrik Pakan Koperasi Sapi Perah

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ABSTRACT

The aims of this study were to evaluate the quality of feedstuff as concentrate feed raw material, the quality of feed concentrate, and customer satisfaction toward concentrate quality produced by the cooperative. The parameters observed were nutrient contents (moisture, ash, crude protein, crude fat, and crude fibre) and physical quality (density, bulk density, and compacted bulk density). Farmer satisfaction was measured using customer satisfaction index (CSI) and gap analysis. The data obtained consisted of primary data (nutrient content of feedstuff and physical quality) and secondary data (nutrient content of concentrates) that were then analysed descriptively. Total respondents in the satisfaction analysis were 100 farmers. The results of this study indicated that feedstuff nutrient content varied, even though corn gluten feed (CGF) was in the range of Indonesian National Standards (SNI). The highest density and bulk density were limestone, and the highest compacted bulk density was salt, while the lowest physical quality was coffee chaff. Nutrient content of concentrate complied with SNI except for crude fat content. Meanwhile, the physical quality of the concentrate was still within the normal range. Farmer satisfaction was in the satisfied category with the highest gap values absence of foreign objects.

Key words: concentrate feed, CSI, farmer satisfaction, feedstuff, quality

ABSTRAK

Tujuan penelitian ini adalah untuk mengukur kualitas bahan pakan sebagai bahan baku pakan konsentrat, mengukur kualitas konsentrat, dan untuk mengetahui kepuasan konsumen terhadap kualitas konsentrat yang diproduksi di koperasi. Parameter yang diukur adalah kandungan nutrien (kadar air, abu, protein kasar, lemak kasar dan serat kasar), dan kualitas fisik (berat jenis, kerapatan tumpukan, dan kerapatan pemadatan tumpukan). Kepuasan peternak anggota diukur dengan menggunakan indeks kepuasan pelanggan (CSI) dan analisis gap. Data yang diperoleh terdiri atas data primer (nutrien bahan pakan dan kualitas fisik bahan pakan serta konsentrat) dan data sekunder (nutrien konsentrat) yang kemudian dianalisis secara deskriptif. Total responden dalam analisis kepuasan adalah 100 peternak. Hasil penelitian ini menunjukkan bahwa kandungan nutrien bahan pakan bervariasi, meskipun begitu corn gluten feed (CGF) berada dalam kisaran Standar Nasional Indonesia (SNI). Berat jenis dan kerapatan tumpukan tertinggi adalah batu kapur dan kerapatan pemadatan tertinggi adalah garam, sedangkan kualitas fisik terendah adalah ampas kopi. Kandungan nutrien konsentrat sesuai dengan SNI kecuali kadar lemak kasar, sementara itu kualitas fisik konsentrat masih dalam kisaran normal. Kepuasan peternak berada pada kategori puas dengan tidak ditemukan benda asing sebagai nilai atribut dengan gap tertinggi.

Kata kunci: bahan pakan, CSI, kepuasan peternak, konsentrat, kualitas

INTRODUCTION

Many types of cooperatives exist in Indonesia. One of those that have a significant role is cooperatives in the agriculture and livestock field, such as dairy farmer cooperative. Dairy farming can't be separated from dairy cooperatives. They have a substantial role for the society that produces high quantity and quality of milk to fulfil the demand. Dairy farmers who are members of the cooperative receive various services to facilitate their businesses. It can be easy to get information managing livestock or get some products that will support farmers' businesses. For example, cooperatives supply concentrate as one type of feed to meet dairy cows' daily needs (Resti *et al*. 2017). Concentrate feed production is a way to help increase milk production because forage only difficult to fulfil cow's requirement due to competitive land among plant forage, agriculture, and tourism area. Thus, concentrate production can help smallholder businesses to be sustainable. Besides, giving concentrate as cows' feed is one of the resources to reduce waste from agriculture since concentrate feed is formed by mixing various agricultural by-products.

Cooperatives are an organization that is quite different from other businesses because they orient on member need than gain business profit. Cooperative is managed and orientated to the prosperity of the members (Boland 2017). Cooperative as business entities that prioritize service to members needs to measure satisfaction at the customer level (farmers). Agricultural cooperative associations have a cross in the service industry so that customers are the main focus in services (Gopinathan & Velmurugan 2017). Information regarding member satisfaction with cooperatives is still limited because the old paradigm likewise stated that members have already become regular customers so that member satisfaction is not well considered. Whereas, long-term relationships will become easier to form when the organization can achieve customer satisfaction. By knowing farmer satisfaction, there will be increased understanding by cooperative for what farmers need more to increase their profit. According to Supriadi *et al*. (2017), customer satisfaction indicators consisted of repurchase decisions, positive word-of-mouth, and no complain. In other words, expectation and performance compromise will affect customer satisfaction. It will also form an advantage relationship that is called customer loyalty (Kuong & Dai 2016). Customer satisfaction acts as a measurement tool toward the success of a business entity in running its business. Besides, it is an assessment of the long-term relationship between customers and service providers, in this case, farmers and cooperative. Factors that can affect customer satisfaction are profit value, seller image, price, perceived quality, and product quality (Hanif *et al*. 2010; Li 2013).

Concentrate feed as one of the cooperative products which have quality attribute determines farmer satisfaction. It has physical and chemical properties, known as nutrient content, which its quality can be affected by the quality of feedstuff composition. Composite feedstuff is one of the elements causing disability of a product other than machinery and workers (Ngadiman *et al*. 2017). The majority of concentrate feed raw material uses local feedstuff that comparatively has a varied quality and can affect the concentrate quality fluctuated or even incapable meet the standard requirement. Unsatisfied farmers toward the product can happen if the quality of the accepted concentrate is not appropriate with what the farmer expected, for example, it happened in KPS Bogor (Purwono *et al*. 2013). Therefore, The study's purposes were to evaluate feedstuff quality as concentrate raw material, concentrate quality, and farmer satisfaction toward the product quality.

METHOD

Location and Time

The research location was one of the biggest dairy farmer cooperatives in Indonesia, KPSBU Lembang, from October 2019 - February 2020. Nutrient quality feedstuff checking was at the Animal Logistics Laboratory, Faculty of Animal Science, IPB University and PAU Laboratory, IPB University. While the feedstuff and concentrate physical quality testing at the Feed Industry Laboratory, Faculty of Animal Science, IPB University.

Sampling and Sample Analysis

Feedstuff samples from different suppliers were collected before being stored in the warehouse. The samples consisted of six wheat bran pollards, two corn gluten feeds (CGF), two palm kernel meals, one coffee chaff, one rice bran, one biscuit waste, one corn bran, one soy sauce by-product, one limestone, and one salt. Samples were taken from bags with the rule if the number of bags was 1-10 sacks, samples were taken in each feedstuff bag. If the bags were 11 or more, the samples were taken from 10 bags randomly. If the bags were less than five, sample at least five probes. The samples were spread on plastic and was divided into four parts (quartering method) and wrapped in zip-lock plastic. The plastics were labeled in the format of the date and place collection time and were packed in a specific design as protection from the weather impacts (light, rain, heat, etc.) during transportation and storage. The sampling techniques were adjusted as stated in SNI 19-0428-1998 (BSN 1998a). The nutrient content of feedstuff tested included moisture, ash, crude protein,

crude fat, and crude fibre based on AOAC (2005). This parameter is the minimum standard that must be met by the product according to the Indonesian national standard (SNI). Physical qualities were tested on feedstuff and concentrate samples produced at cooperative, in the form of density, bulk density, and compacted bulk density based on the Khalil method (Khalil 1999). The density was measured with Archimedes principle by seeing water volume changes in measured glass 500 ml. The sample was poured into the measured glass and then weighed. The water was then also poured 50-100 ml, and feed volume was the volume changes (Khalil 1999), the units converted to kg/m3. The equation used was listed below:

$$\text{Density} = \frac{\text{Sample mass (g)}}{\text{water volume changes (ml)}}$$

The bulk density was measured by pouring 100 g sample into the measured glass 500 ml, and the equation used was:

$$\text{Bulk density} = \frac{\text{Sample mass (g)}}{\text{Volume (ml)}}$$

The compacted bulk density was measured by pouring 100 g sample into the measured glass 500 ml and then was shaken manually until getting constant volume (Khalil 1999). The equation used was:

$$\text{Compacted bulk density} = \frac{\text{Sample mass (g)}}{\text{Volume (ml)}}$$

Meanwhile, the nutrient content of concentrate produced was secondary data obtained from cooperative based on proximate analysis conducted in December 2019. All data were analysed descriptively and was compared to SNI or previous studies if the standard were not available.

Measurement of farmer satisfaction with the product quality

Respondents in the determinants of customer satisfaction were member farmers who joined the cooperative. The questionnaire was given to 150 members and was chosen based on purposive sampling. Only 100 questionnaires with suitable criteria were used in data analysis. This amount was sufficient to the minimum limit in determining respondents based on the Slovin formula (Ansar *et al*. 2017). The error value is 0.1, and the total population of the cooperative member was 7552 members. The Slovin formula is listed in the equation below:

$$n = \frac{N}{1+N\alpha^2}$$

Information :

N = population

n = number of samples

α = error tolerance value (10%)

Table 1 Product quality attributes that asked to farmers

No	Attributes
1.	The concentrate received has normal colour, normal texture, and normal odour
2.	Concentrate packaging in good condition
3.	Price according to quality
4.	Suitable concentrate weight
5.	Absence of foreign objects
6.	Concentrate mix homogeneously

The independent variable in the questionnaire was product quality consisting of six attributes presented in Table 1. Table 2 shows the level of performance and level expectation answers using a range of 4 scales. According to Beglar and Nemoto (2014), four scales are fit for those who are less in motivation and have limited time to fill the questionnaire. First, the validity and reliability of the questionnaires were tested to know the Cronbach alpha value and answer validity. The Cronbach alpha value for reliability testing is 0.6 (Ursachi *et al*. 2015). The questionnaire attribute was analysed when the validity results showed a valid number and the Cronbach alpha value on the reliability test showed the corresponding value. Customer satisfaction was measured using the customer satisfaction index (CSI) method (Gunawan & Iqbal 2018). The final value was related to the farmer satisfaction index value that was resulted from the calculation of the maximum scale value (in this study 4 scale), then divided by four and determined the upper and lower limits which are presented in Table 3. The gap value was analysed using calculating the average value of performance and expectations to determine improvement analysis attributes. The equation of customer satisfaction measurement are listed below:

$$\text{MIS} = \frac{\sum_{i=0}^{n} Yi}{n} \text{ and } \text{MSS} = \frac{\sum_{i=0}^{n} Xi}{n}$$

Information :

n = number of respondents

X = performance value of ith X variable

Y = performance value of ith Y variable

MIS = mean importance score

MSS = mean satisfaction score

$$\text{WF} = \frac{\text{MiSi}}{\sum_{i=1}^{p} \text{MiSi}} \times 100\%$$

P = attribute of pth importance

WF = weight factor

WS =WF × MSS

WS = weight score

$$\text{CSI} = \frac{\sum_{i=1}^{p} \text{WS}}{4} \times 100\%$$

Table 2 The score of the respondent's answer in the level of performance and importance

Score (Value)	Performance	Importance
1	Poor	Unimportant
2	Less good	Less important
3	Good	Important
4	Very good	Very important

Table 3 Interpretation of farmer satisfaction index number

Index number	Interpretation
75% - 100%	Very satisfied
50% - 74%	Satisfied
25% - 49%	Unsatisfied
0% - 24%	Very unsatisfied

RESULT AND DISCUSSION

Nutrient Content and Physical Quality of Feedstuff

Evaluation of nutrient content and physical qualities of feed are shown in Table 1 and Table 2. According to SNI, the nutrient contents of wheat bran pollard are maximum moisture 13%, most ash 6%, minimum crude protein 13%, minimum crude fat 3.5%, and highest crude fibre 12% (BSN 2014). Almost all nutrient contents tested on wheat bran pollard were suitable, except for the moisture content. Coffee chaff contains 7.3% moisture, 16-19% crude protein 1.56-3.28% crude fat, 7% ash, and 27.4% crude fibre (Narita & Inouye 2014; Guglielmetti *et al*. 2019; Ateş & Elmaci 2018). The results showed that the moisture, crude fibre, and ash content were relatively higher, the protein was low, but crude fat content was still in the normal range. Furthermore, according to the standard, nutrient content of rice bran are maximum moisture content 12%, crude protein content range from 8% to 12%, limitation crude fibre 16%, 15% of ash, and 20% of crude fat (BSN 2013). According to the protein suitability, the rice bran analysed was quality III category. The nutrient content that unsuitable was the moisture content and crude fibre that showed a higher value than the standard. Biscuit waste is from baby food that did not pass the quality control process in the industry, packaging defects, for example. According to SNI, nutrient content of biscuit waste is maximum moisture 4%, highest ash 3.5%, most crude protein 8-22%, 6-15% of fat with fibre content less than 5% (BSN 2005), and the results showed conformity except for fat content. Palm kernel meal has a maximum moisture content of 12%, crude fat content 9-10%, crude protein content 14-16%, ash content 5-6%, and crude fibre 16-20% (BSN 2017). The results showed that moisture, crude protein, and crude fibre in the palm kernel meal complied with the standard, and the rest were unsuitable.

Corn bran by standard contains 12% of moisture content, 8.5% of crude protein content, 4% of crude fat content, 3-6% of crude fibre content, and a maximum of 1% of sand and silica content (BSN 1992). Meanwhile, the results showed that the moisture complied with the standard, but some nutrient content was still below the standard. According to the standard, CGF maximum moisture content 12%, minimum crude protein content 20%, limitation crude fibre c ontent, and ash 11% and

Table 4 Nutrient content of feedstuffs

Feedstuff	Nutrient content (% as fed)				
	Moisture	Ash	Crude protein	Crude fat	Crude fibre
Wheat bran pollard	11.23-13.48	4.39-5.51	15.76-17.30	3.85-5.31	7.87-8.90
Coffee chaff	9.60	9.36	14.23	2.04	30.09
Rice bran	14.66	11.13	8.04	3.99	19.05
Biscuit waste	2.21	1.12	15.21	5.50	3.97
Palm kernel meal	3.63-3.84	4.15-4.40	12.76-15.24	7.92-8.43	16.53-17.73
Corn bran	10.67	2.45	7.96	3.82	6.97
Corn gluten feed (CGF)	5.20-5.22	5.09-5.72	20.74-24.62	2.65-3.34	9.55-11.20
Soy sauce by-product	38.19	12.63	20.30	2.32	16.53
Limestone	0.19	-	-	-	-
Salt	8.30	-	-	-	-

8%, respectively with at least 2.5% of crude fat content (BSN 1998b), and the results showed all nutrient content was in the standard range. The nutrient content of soy sauce by-product from previous studies show 14.8-28.78% of crude protein content, 1.84-7% of crude fat, 27.2-46.17% of crude fibre, 38.2% of moisture, and 7.8% of ash content (Purwandani *et al*. 2017; Susanti 2006). The results show that moisture, crude protein, and crude fat content were suitable, but still contained high ash and low crude fibre. The moisture content of limestone and salt according to each standard is <5% (Garinas 2019) and 3-7% (Rusiyanto *et al*. 2013). The content of limestone was following the standards, but the salt did not meet the standard.

Based on the suitability of the results with several standards and previous studies, CGF was the ingredient that had nutrient content following the standard because it is a factory product. CGF was a multinational companies product. It could be sure that the factory has implemented a good manufacturing process (GMP) so that the quality of the product was suitable with the standard. Even so, some feedstuff had different values from the standards or previous studies. Higher moisture was showed by wheat brand pollard, rice bran, coffee chaff, and salt.

Moisture is a critical point in nutrient content because it can damage the feedstuff quality. It initiates fungal growth so that mycotoxins will appear which can endanger dairy cows if the feed is consumed. Some factors that cause high moisture content are storage time and temperature (Miftahudin *et al*. 2015; Ahmed 2015). Another reason that causes high moisture levels in salt is high hygroscopic properties, hence the salt can bind

Table 5 Physical quality of feedstuff

Feedstuff	Density (kg m^{-3})	BD[a] (kg m^{-3})	CBD[b] (kg m^{-3})
Wheat bran pollard	1,003-1,120	390-570	530-690
Coffee chaff	301	140	240
Rice bran	1,020	470	660
Biscuit waste	1,160	650	800
Palm kernel meal	1,090-1,180	900-960	1,110-1,140
Corn bran	690	510	660
Corn gluten feed (CGF)	1,230-1,570	680-690	900-920
Soy sauce by-product	1,080	890	1,020
Limestone	2,000	1,490	2,210
Salt	1,740	1,580	1,880

BD: bulk density; CBD: compacted bulk density

water from the air. Another nutrient content that showed a considerable difference was high crude fibre in rice bran. The presence of rice husk and the effect of the rice milling process can affect crude fibre content. It can also be caused by the rice varieties (Akbarillah *et al*. 2007). Feedstuff that showed differences with standard or previous studies were coffee chaff, soy sauce by-product, palm kernel meal, and corn bran. The nutrient content in coffee chaff and soy sauce by-product varied. Even so, this did not indicate the poor quality of the two ingredients because the moisture content contained in the material was still in normal conditions and at least it would not cause spoilage. Meanwhile, corn bran was different from standards because of this product from other islands so that it got through long-distance and time during transportation. A product will lose weight and moisture content if the ambient temperature is not controlled during transportation (Mathowa 2014).

Table 5 shows the physical qualities of feedstuff used in the manufacture of concentrate. Density is affected by particle surface characteristics, particle size distribution, and nutrient content of the material so that differences in density of feedstuff will affect the homogeneity of the mixture because a large difference in density will cause an unstable mixture (Yatno 2011). Furthermore, compacted bulk density is influenced by bulk density which is also closely related to density. From the previous explanation, it can be concluded that all physical qualities are interconnected, and these affect the handling and processing of feedstuff into finished products.

Based on the results obtained, the lowest density was coffee chaff (301 kg m^{-3}), this was due to the high crude fibre content that can make coffee chaff lighter but voluminous, meaning that it could fill more space with more weight. The highest density was limestone (2,000 kg m^{-3}) because it had a high ash content that indicated a high mineral content so that it is heavier in small

Table 6 Nutrient content (%) of concentrate produced by the cooperative

Parameters	Nutrient content (% dry matter basis)	
	SNI*	Cooperative**
Moisture	≤14.00	6.80
Ash	≤10.00	9.37
Crude protein	≥16.00	16.98
Crude fat	≤ 7.00	9.92
Crude fibre	-	21.27

*source: (BSN 2009); **Secondary data on the results of tests conducted by cooperative in December 2019

amounts. The bulk density of the feedstuff also varied likewise compacted bulk density. The higher the bulk density, the higher the compacted bulk density. The lowest bulk density and compacted bulk density were coffee chaff. Low bulk density also caused low compacted bulk density in coffee chaff. Bulk density and compacted bulk density range from 140 kg m^{-3} to 1,580 kg m^{-3} and 240 kg m^{-3} to 2,210 kg m^{-3} respectively. Wide differentiation of physical quality of feedstuff must be concerned because it can affect the quality of concentrate mixture in the end. Thus, some ways can be conducted to handle this problem, such as giving attention to mixing time and sequencing feedstuff in the mixing process. The mixing process with high bulk density will be difficult and likely to cause segregation (Shenoy *et al*. 2015). Besides, bulk density and compacted bulk density also have important roles in determining storage space for feed, such as silo capacity and packaging (Syamsu *et al*. 2015).

Nutrient Content and Physical Quality of the Concentrate

The nutrient content of concentrate produced in the cooperative is shown in Table 6. The nutrient content in the concentrate was under SNI except for crude fat which its value was above the standard (9.92%). The Cooperative used the price as the main reference rather than nutrition value in the formulation to keep the concentrate price stable despite the feedstuff price increases. High-fat content causes negative effects in the digestion process, thereby dry matter intake (DMI) decreases, milk production and milk fat content also decrease (Marín *et al*. 2013; Fearon *et al*. 2004). Excessive fat in the feed will stick to the surface of the fibre in the rumen so that the process of fibre fermentation is disrupted and even toxic to cellulolytic microbes that lead to decreased digestion (Nawaz & Ali 2016).

Table 7 showed that the physical quality of the concentrate produced. The physical quality of the concentrate feed was between the highest and lowest physical qualities of the feedstuff. Concentrate feed density was above 1,000 kg m^{-3}, this value was high so that it could increase storage and transportation

Table 7 Physical qualities of concentrate produced by the cooperative

Physical qualities	Value (kg m^{-3})
Density	1,066
Bulk density	355
Compacted bulk density	480

capacity. Besides, high-density concentrates make it possible to get contact with rumen microbes faster when it is digested in the dairy cows' body so that digestion rate increases (Toharmat *et al*. 2006). According to Kaske *et al*. (1992), the density of 1.44 g ml^{-1} (1,440 kg m^{-3}) of feed can pass directly to abomasum compared to 0.92-1.33 g ml^{-1} feed (920-1,330 kg m^{-3}). The next characteristics were bulk density and compacted bulk density. These characteristics are related to crude fibre content. The value of bulk density feed that comes from pineapple waste for dairy is in the range of 300.56 – 343.33 kg m^{-3} (Buliah *et al*. 2019), while the value in this research is quite higher. The same fact was found in the compacted bulk density. The value of compacted bulk density is 191-362 kg m^{-3} in Toharmat *et al*. (2006). This can be caused by the presence of crude fibre in concentrate feed produced by cooperative is relatively lower which indicated that the concentrate feed was not too voluminous. Voluminous feed will cause satiety faster because it fills the space in the rumen and leads to decreased digestion (Toharmat *et al*. 2006). Even though bulk density and compacted bulk density are different, but this is quite closely related

Customer Satisfaction on Product Quality

The variable of CSI measurements in this study was the products received by farmers. Product quality attribute used represents what can be seen and accepted directly by farmers. Table 8 shows the results of the CSI calculation. The CSI value obtained from the calculation of satisfaction was 73.94%, and this was in the satisfied category. This value is not the maximum value because the maximum satisfaction index from this rating is very satisfied. The performance done by the cooperative had not yet reached the maximum value of expectations that were considered important by farmers. Therefore, The performance to produce products needs to be improved. When relating with the quality of feedstuff, this result could be understood because some of the feedstuff used in cooperative in terms of nutrition and physical quality still much varied, and some nutritional compositions were still below standard so the quality of the final product was affected. Besides, some feedstuff physical quality showed different value so that it caused concentrate feed did not mix properly. Regarding the value, farmers will be expected to repurchase products, minimize spreading negative issues about the product,

Table 8 Average of importance and performance value in every attribute and CSI value

No	Attribute	MIS	MSS	WF	WS
1.	The concentrate received has normal colour, normal texture and normal odour	3.51	2.92	0.17	0.49
2.	Concentrate packaging in good condition	3.51	3.05	0.17	0.51
3.	Price according to quality	3.39	2.82	0.16	0.46
4.	Suitable concentrate weight	3.51	3.20	0.17	0.54
5.	Absence of foreign matter	3.49	2.83	0.17	0.47
6.	Concentrate mix homogeneously	3.52	2.92	0.17	0.49
				WT	2.96
				CSI	73.94

but possibly doing some complaints. This fact can be seen in the gap analysis that is presented in Table 9.

From the data shown in table 9, the biggest gap was in the absence of foreign objects. In the sense of that, farmers found many foreign objects in the concentrate. The existence of foreign objects commonly occurs in the feed, but the value will decrease if it is controlled properly. The existence of foreign objects is detrimental to farmers because dairy cows will reject to consume the feed, hence this can endanger the dairy cows. Then, the next attribute was properly concentrate mixture. An inhomogeneous concentrate mixture could be caused by the physical quality of feedstuff which varied considerably, as shown in Table 5. Different densities can cause a segregation phenomenon in which heavier density material will stick at the bottom and lighter density is at the top (Li *et al*. 2010).

The next attribute is about organoleptic properties, such as colour, texture, and smell. Normal concentrate feeds organoleptic is indicated by the suitability of colour, smell, and texture with raw material. For example, the colour is light, the smell does not stink, and the texture is not sticky (Christi *et al*. 2018). The most possible organoleptic characteristic that is complained by the farmer is a bad odour because the appearance

Table 9 Prioritized attributes to be corrected based on gap analysis

No	Attribute	Gap
1.	Absence of foreign objects	-0.66
2.	Concentrate mix homogeneously	-0.60
3.	The concentrate received has normal colour, normal texture and normal odour	-0.59
4.	Price according to quality	-0.57
5.	Concentrate packaging in good condition	-0.46
6.	Suitable concentrate weight	-0.31

(colour) and texture are quite normal. The abnormal organoleptic properties of concentrates can occur with chemical changes in feedstuff when stored in the warehouse. The data in Table 4 shows some feedstuff had higher moisture content than standard. According to (Islam *et al*. 2015), the high moisture content will generate different smells although the physical appearance is still normal if stored for a longer time. Furthermore, the bad odour could also be caused by high-fat content on the finished product as shown in Table 6. Rancidity can occur if the feed has high unsaturated fat content which can generate objectionable odour and taste (Durga *et al*. 2019).

The next attribute was the price of concentrate compared to the quality of concentrate in the fourth position. The Cooperative determined a price that was in line with the farmers' abilities although the price of feedstuff commonly increased. The Cooperative must stabilize the prices of concentrate according to the farmer's agreement so that the feedstuff used by the cooperative was adjusted to prices that could be accessed by farmers. The gap occurs in packaging because there was some damaged packaging during the distribution process due to improper handling. Then the lowest gap value was the suitability of concentrate weight. The differences were small to occur because each concentrate feed was weighed before the bag was sewed. Even though unsuitability is quite possible because there were many foreign objects in the sack that could decrease the net weight of the concentrate.

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CONCLUSION

The nutrient content of some feedstuff was varied, and only CGF had nutrient content complying with the standards. Limestone as the mineral source was the highest density and bulk density, and salt was the highest compacted bulk density. Coffee chaff had the lowest density, bulk density, and compacted bulk density. The quality of concentrate produced in the dairy farmer cooperative was within national standard except for crude fat content. Besides, it also has quite good physical quality. Farmer satisfaction toward the product was in the satisfied category with the absence of foreign objects as the highest gap value. The results allow the dairy cooperative to make an effort to produce a higher quality of feed to increase farmer benefit by increasing control activity in the production process. Quality consistency also should be improved by stabilizing the quality of feedstuffs from a different supplier.

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