

## Application of Science and Technology Based on Local Feed Waste for Livestock Farmer Group in Tuntungan II Villages, Pancurbatu, Deli Serdang Regency

*Achmad Sadeli\*<sup>1)</sup>, Nevy Diana Hanafi<sup>1)</sup>, dan Ma'ruf Tafsir<sup>1)</sup>*

<sup>1)</sup> *Animal Science Department, Faculty of Agriculture, Universitas Sumatera Utara*

**Abstract.** Deli Serdang Regency is one of the regencies in North Sumatra which has the potential for developing beef cattle consists of cattle and goats. Livestock commodities such as beef cattle and goats have indirect linkages to input-output between industries, consumption and investment. The problem faced by farmers were the livestock productivity was not optimized. In general, optimization of livestock productivity is closely related to aspects of breeding, feeding and management. The fundamental problems faced by partners today involve providing feed that meets the needs of livestock as well as fast and good fattening. The activities were carried out including: Preparation of forage fermentation, complete feed fermentation and Multi Nutrient Blocks (MNB) for animal feed. The details of the output of the program produced include: 1) Mastering fermentation-based agricultural and plantation waste processing technology 2) Extension services and assistance to increase productivity of beef cattle 3) Independence of farmers in processing cassava chips industrial waste as animal feed to improve their quality and availability in the form of fermented feed and complete feed products 4) Mastering livestock supplement making technology in the form of Multi Nutrien Block (MNB) 5) Guidebooks, leaflets, seminars and scientific publications. The expectation of this activity was reached, in which the farmers can make fermented feed, complete feed and multi nutrient blocks (MNB) well. However there still a need to utilized other local food waste sources so that farmers have more choices of feed given to their livestock.

**Keywords:** Multinutrient block, Fermentation, Complete feed, Ruminant

**Abstrak.** Kabupaten Deli Serdang salah satu kabupaten di Sumatera Utara yang memiliki potensi pengembangan ternak potong berupa sapi dan kambing. Komoditas peternakan seperti sapi potong dan kambing memiliki keterkaitan tidak langsung terhadap input-output antar industri, konsumsi, dan investasi. Permasalahan yang dihadapi peternak sampai saat ini adalah masalah produktivitas ternak yang masih

\*Corresponding author at: Animal Science Department, Faculty of Agriculture, Universitas Sumatera Utara

E-mail address: achmadsadeli1@gmail.com

*belum dapat dioptimalkan. Secara umum, optimalisasi produktivitas ternak sangat terkait dengan aspek breeding, feeding, dan manajemen. Permasalahan mendasar yang dihadapi oleh mitra sekarang ini menyangkut penyediaan dan pemberian pakan yang memenuhi kebutuhan ternak serta cara penggemukan yang baik dan cepat. Rencana kegiatan yang akan dilakukan meliputi : (1) Pembuatan fermentasi hijauan pakan ternak, (2) Pembuatan fermentasi pakan komplit dan (3) Pembuatan Multi Nutrien Blok (MNB). Rincian luaran program yang dihasilkan meliputi : 1) Menguasai teknologi pengolahan limbah pertanian dan perkebunan berbasis fermentasi 2) Jasa penyuluhan dan pendampingan peningkatan produktivitas ternak sapi potong 3) Kemandirian peternak dalam pengolahan limbah industri kripik singkong sebagai pakan ternak guna meningkatkan kualitas dan ketersediaannya dalam bentuk produk pakan fermentasi dan complete feed 4) Menguasai teknologi pembuatan suplemen ternak berupa Blok Multi Nutrien (MNB) 5) Buku panduan, leaflet, seminar dan publikasi ilmiah. Hasil dari pengabdian ini peternak dapat membuat pakan fermentasi, pakan komplit dan multi nutrien blok (MNB) dengan baik. Kesimpulan dari pengabdian ini perlu adanya pengabdian lanjutan dengan memanfaatkan sumber limbah pakan lokal lainnya sehingga peternak lebih memiliki banyak pilihan pakan yang diberikan pada ternaknya.*

**Kata Kunci:** *Multinutrien blok, Fermentasi, Pakan komplit, Ternak ruminansia*

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## **1. Introduction**

Deli Serdang Regency is one of the regencies in North Sumatra which has the potential for developing beef cattle consists of cattle and goats. Livestock commodities such as beef cattle and goats have indirect linkages to input-output between industries, consumption and investment. The additional aspects that arise are not only measurable economic values (quantitative), but also will play a role in a multi-sector context as environmental sustainability, biodiversity, as well as socio-cultural or religious aspects.

Current conditions indicate that the development of cattle farms in Deli Serdang Regency is also showing good results. The development of beef cattle population in Deli Serdang Regency is also showing good development. The average increase in beef cattle population in Deli Serdang Regency reaches 12.38 percent/year while for goats even though it is still low but there is an increase of about 1.26 percent/year. The potential marketing coverage of beef cattle products is very wide open, although we have not been able to meet domestic needs. Demand for food products from livestock (beef cattle) is expected to always increase given the increase of population and income per capita community which will encourage changes in consumption towards meat (livestock). The Indonesian White Paper 2005-2025 states that the beef production

research target is to support the fulfillment of 90% of beef needs supplied by domestic production at the end of 2009, 98% at the end of 2015 and self-sufficiency in beef in the end of 2016 [1].

The problem faced by farmers until now is the problem of livestock productivity that still cannot be optimized. In general, optimization of livestock productivity is closely related to aspects of breeding, feeding and management. The fundamental problems faced by partners today involve providing and feeding that meets the needs of livestock as well as fast and good fattening.

Supply and provision of feed for beef cattle related to quality, quantity and continuity that is adequate both for forage and concentrate as well as adding supplements. The supply of forage in partner locations relies heavily on forage sources originating from forages around farmers plus the cassava chips industry waste in the form of cassava peel along with other processed residues. The problems that arise can be either technical or social/legal aspects. The technical aspect of forage provision is that there is still a small amount of forage land owned by farmers and the difficulty of getting forage in the dry season. Therefore, livestock feed requirements is difficult to meet.

Based on the description of the problems above, then the priority problems faced by partners can be formulated, including the preparation and techniques of supplementary feeding with fermentation technology using materials based on locally available feed components, preparation and technique for making complete feed based on agricultural waste and the preparation of livestock supplements in the form of Multi Nutrient Blocks (MNB).

## **2. Methods**

### **2.1 Approached Method**

The approach taken in overcoming partner problems after problem identification is to make alternative solutions formulated in the activity plan. The approach is carried out through the application of science and technology that has been produced by college to the community through several activities such as counseling, education and training, and making products. This approach is expected to increase the productivity of beef cattle owned by the partners.

## 2.2 Activity plan

Based on the description of the priority problems raised in the sub-section of the problem, the planned activities to be carried out include three aspects of problem solving, forage feed fermentation, complete feed fermentation and multi nutrient block.

### 1. Forage Feed Fermentation

Farm people rely forage resources derived from land (forage) field. The nutritional quality of natural forages varies greatly and fluctuates depending on the season and generally has lower nutritional quality than forages originating from sub-tropics [2],[3]. There are some efforts to improve the quality of the forage. One strategy forage quality improvement can be done particularly through the fermentation of feed processing technology.

In the making of silage needed some tools that scale, mixer and silo. Mixer can be a shovel while silo can be a drum / barrel or plastic bag. Silage making the use of several materials include leftover grass / fresh grass that had withered, fine corn, rice bran and EM4. The composition of silage are listed in the table 1.

**Table 1.** The Composition of silage

<b>Ingredient</b>	<b>Dosage</b>
Leftover Grass	100 kg
Fine Corn	3 %
Rice Bran	3 %
Molasses	1 %
EM4	1 ml/kg of feed

Sumber : Tim Pengabdian (2018)

First cut the grass with a size of 3-5 cm after, input of forage in the silo gradually layer by layer. Each layer was sprinkled with bran and fine corn then sprinkled again with a mixture of water, molasses and Em4 and then continued with the next layer so that the silo filled with solids and finally the silos were closed tightly so the air could not enter. Then, the silage was fermented for approximately 3-10 days.

### 2. Complete Feed Fermentation

Complete Feed is a feed formulation technology that mixes all feed ingredients consisting of forages (agricultural waste) and concentrates mixed into one without or with only a handful extra fresh grass. Complete Feed is a balanced diet that has been fully equipped to meet the nutritional needs of cattle, good for growth, tissue maintenance and production. This diet does not require any additives except drinking water. Therefore, the complete feed is more practical and greatly saves labor because the farmers no longer need to look for grass every day.

In making complete feeds, several tools are needed, including mixing equipment, scales and silos. Mixers can be in the form of shovels or feed mixers while silos can be plastic or plastic drums which are important for anaerobes condition. The complete feeds is made of several ingredients including leather cassava, dried cassava, molasses, urea, minerals, soybean meal, rice bran and EM4. The composition of the ingredients for the complete feed is presented in the table 2 below.

**Tabel 2.** The composition of the ingredients for complete feed

<b>Ingredient</b>	<b>Percentage (%)</b>
leather Cassava	50 %
Dried Cassava	25 %
Molasses	5 %
Urea	2 %
Minerals	1 %
Soybean Meal	12 %
Rice Bran	5 %
EM4	1 ml/kg feed

Sumber : Tim Pengabdian (2018)

The initial stage begins by weighing the feed ingredients according to the composition then the feed is spread over the tarpaulin then mixed until homogeneous moistened with EM4 mixed with water and molasses. The mixture was later inserted into the silo and finally closed to create anaerobic conditions in the silo. All the ingredients that have been mixed and form a complete feed are fermented for one to two weeks.

### 3. Multi Nutrient Block (MNB)

Forage nutrition improvement strategies are carried out by supplementing nutrients that meet the needs of protein, energy, and minerals, including through urea and salt supplementation [4] or with more complete components with MNB [5]. Furthermore Hanafi [6] has tested the use of MNB in sheep livestock with good results on the growth and digestibility of dry matter and organic matter.

Several types of tools are needed for making MNB, namely molds, scales and mixers. Molds can be made from a variety of materials such as plastic, buckets, wooden or metal boxes while mixing devices can be shovels or feed mixers. Making MNB uses several ingredients including molasses, rice bran, palm kernel cake, fish meal, salt, calx, urea, cement and minerals. The composition of MNB ingredients is listed in the table 3 below.

**Tabel 3.** The Composition of MNB Ingredients

<b>Ingredient</b>	<b>Percentage (%)</b>
Molasses	30 %
Rice Bran	20 %
Palm Kernel Cake	15 %
Fish Meal	5 %
Salt	7 %
Calx	6 %
Urea	5 %
Cement	8 %
Minerals	4 %

Sumber : Nevy *et al* (2016)

According to Hanafi *et al.* [7] the process of preparation is carried out through several stages:

1. Premixing: mixing a small amount of ingredients used
2. Mixing: mixing all components of the ingredients to be made by MNB
3. Pressing: making of blocks by using a mold
4. Drying: by oven with a temperature of 60°C for 24 hours or dried in the sun to dry.
5. *Packaging* : packaging using gunny or plastic containers.

The MNB was made by firstly weigh the correct amount of all ingredients needed and mix well. After mixing with the composition ingredients the other ingredients and the most recently added molasses until the dough is smooth, then input into a molding tool and then pressed. The molding tool can make 4 pieces MNB with the weight ranging from 2.5 kg to 10 kg. After being pressed, the drying process was carried out for one until three day to dry. Finally the MNB can be packed or stored at room temperature.

### **3. Results and Discussion**

Program service activities has been implemented in the Tuntungan II Village livestock group, Pancurbatu, Deli Serdang Regency. The activity was carried out through several stages as follows.

#### **1. Preparation Phase**

The event was started with the introduction of dedicated team to the service partners in the village Tuntungan II, Pancurbatu, Deli Serdang. The team consisted of 3 lecturers and 2 students. The team had a preliminary discussion with the head of the group of beef cattle and goats in Tuntungan II Village, Pancurbatu, Deli Serdang. During discussion the dedicated team was looking for an information on what constraint was faced by the partners. The partners informed that the main obstacles

for cattle and goat farmers in area were the less optimal livestock productivity and the problem of limited forage land resulting in livestock did not get optimal feed.

In addition, the farmers have no ability to utilize local food sources at partner sites in the form of agricultural or industrial waste. In fact there there is a lot of cassava leather waste, and the leftover wasted animal feed that can be reused as animal feed. If the farmers are able to utilize various types of waste, it would be very helpful to overcome the problem of less optimal livestock productivity. Based on information obtained from the farmers, the team discussed and formulated a solution that would be offered and implemented to help the farmers in Tuntungan II Village, Pancurbatu, Deli Serdang. Formulation of solutions was offered and made in the form of activity proposals submitted to the USU Community Service Agency to obtain funds for the implementation.

## 2. Implementation Phase

The implementation phase from the first visit was outlined in the form of a proposal and then received grant funding from the USU Community Service Agency. Then, the team carried out activities that had been formulated to provide solutions for cattle and goat farmers in Tuntungan II Village, Pancurbatu , Deli Serdang Regency. It is expected that the activity resulted in the increase of livestock productivity by utilizing local feed waste found in partner locations with feed precessing technology. Some of the activities that were carried out in the formulation are as follows:

### a. Matching Perceptions with Partners

Before the service activities were started, the service team again held further discussions with the service partners to reach the right solution in the problems faced by farmers in their location. The discussion was done so that can produce something that is expected to be shared.

### b. Ordering and Purchasing Equipment and Materials for The Activity

After the solution was obtained and agreed upon by the team and partners, orders for MNB printing equipment, fermented barrel and feed ingredients were made for the manufacture of fermented feed, complete feed and MNB. Furthermore, the team calculates the nutritional composition of fermented feed Complete feed and MNB so that quality feed can be obtained and can increase livestock productivity in the service partner location and after that the service team prepares by training students in the procedure for making fermented feed, complete feed and MNB, and try to make a good composition in the fermented feed, complete feed and MNB.



**Figure 1.** Service equipment and materials

c. Extension and Training Fermentation Feed Processing, Complete Feed and MNB  
 Extension activities and training on processing fermented feed, complete feeds and MNB to partners were held on June 1, 2018 at the partner site of Desa Tuntungan II, Pancurbatu, Deli Serdang Regency. This activity is further divided into 2 activities, namely:

1. Extension Activities

Extension activities were carried out by presentation and discussion with the partner, The materials covered the benefits advantages and nutritional content of fermented feed, complete feed and MNB. In addition, it was also described on how to make and give the feeds to livestock, so that eventually the feeds are expected to increase the productivity of cattle and goats in Tuntungan II Village, Pancubatu, Deli Serdang Regency.

2. Training Activities

Direct training activities were carried out by demonstrating how to make fermented feed and complete feeds to the service partners. The first training was about making fermented feed by utilizing forage waste in the form of forage with the help of EM4 inoculum. Firstly the remaining forage was prepared and chopped with a size of approximately 5 cm. In another container molasses, urea and EM4 were completely dissolved. Then the forage that has been chopped was spread over the tarpaulin to form a layer of approximately 5 cm and then sprinkled with bran, then doused with a mixture of molasses, urea and EM4 solution. The activity was repeatedly done until all the ingredients run out and the final mixture looked wet. Finally, put the mixed into a fermentation barrel or in a large plastic bag by inputting the mixture gradually and compacted until it was completely solid and then stored in anaerobic or

airtight conditions. Then fermented for approximately 3-7 days until the feed material mature or with traits smelling.



**Figure 2.** Training feed production fermentation, complete feed and MNB

The next training for making complete feeds was to prepare the required ingredients, where the main feed used is cassava leather. The cassava leather was chopped in small size and overlaid on a tarp and then sown with rice bran, cassava pulp, minerals, and calcite. Mean while salt, urea, molasses and EM4 were dissolved in water until all ingredients were well blended. Then the solution was sprayed or sprinkled over the expanse of the material until evenly distributed and if necessary add water until the water content reaches 60% or can be seen by clenching it in the hand when wet and the water does not drip then the water content is sufficient. The last training was the making of MNB, which was started by preparation of the required materials. Firstly, the materials rice bran, palm kernel cake, fish meal, calx, cement and minerals were spreaded on tarps. Mean while molasses, urea and salt were dissolved in water. Then mix the solution and expanse of the material bit by bit until all ingredients were mixed and formed a dough that is smooth. The dough was subsequently put in the printing press and then pressed using MNB printing tools. Finally, the material was dried for about one day.

#### d. Installation Signpost Activities

A signpost as a proof of accomplishment the activity was installed at the location of the service partner in Tuntungan II Village, Pancurbatu, Deli Serdang Regency. The signpost was installed by the group members and assisted by the team.



**Figure 3.** Signpost name of service team

#### 4. Conclusion

Products fermented feed, complete feeds and MNB have been produced and partners have understood and are able to make fermented feed, complete feeds and MNB. It is necessary to evaluate the impact given to livestock on a regular basis so that the development of the livestock is known.

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