Quarterly Progress Reports
FIELD TRIAL ON BENEFICIAL FORAGE SPECIES FOR DAIRY FARMERS IN SALUYU KUNINGAN AND CIKAJANG GARUT COOPERATIVES, WEST JAVA - INDONESIA

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</table>
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               Ossy Rama
               Veski Zunius                                                                                                                       |
| Related Stakeholders | : Trouw Nutrition
               Pioneer (Dupont)
               Barenburg
               PTPN (State owned company for estate) VIII
               BUMN Hijau Lestari
               Dinas Peternakan Garut & Kuningan                                                                                                    |

Introduction :

Based on pre study regarding dairy feed availability in Saluyu and Cikajang, it is revealed that high quality forage availability is very limited. This is due to limited area for forage production, limited knowledge of farmer regarding potential forage species, cultivation technique and forage conservation, and lack of the awareness of farmer to provide high quality. Farmers fed dairy cows with rice straw instead of grasses. Low quality of rice straw due to lignin and silica content may cause problem in digestive tract of cows and low productivity.

This program is conducted to introduced potential and productive forage species, improve farmer’s knowledge in forage production, introduce forage conservation technique and increase awareness of farmers in providing high quality of forages, increase utilization of high quality of forages instead of rice straw, and initiate forage business in cooprative levels.

Program/Scope of work :

1. Farmer and Field Location Selection

   Selection of Farmer and Demofarm for both cooperatives Saluyu (Kuningan) and Cikajang (Garut) were conducted on October 2015. Three farms for each coop were selected with the criteria as follow: a) farms/farmers is highly motivated to join as Demofarm and improve productivity of teir dairy cows; b) have at least 200 m² lands for growing introduced forages; c) have experience in rearing dairy cows and capability in distribution of information. The farmers name in Cikajang are Pak Dini (Pasir Pogor), pak Enjang (Sumadera) and pak Adis (Pamegatan). Meanwhile in Saluyu the selected farmers are pak Dudung (Parigi), pak Rakum (Cigeureung) dan pak Husen (Gunung Keling). The farmers provided and prepared lands for forage trial, and according to protocols they care the plants.
2. **Plant materials and Equipment Procurements**

   Plant material/seed > According to Head of Plant Quarantine Center to get a permit for importation of seeds (sorghum, Brachiaria Mulatto Hybrid, Panicum (mombasa) Stylosanthes (Ubon) from Thailand, the seeds are now being tested for Risk Analysis for Plant hazardous organism and still take 2 months. The letter of permission to import sorghum seed has been issued by the Plant Quarantine Office. It is expected that the sorghum seed will be soon sent to IPB. The other seeds of forage species in particular those are not yet recognized by Indonesian government, has to be tested, and being awaited. During waiting arrival of imported seeds, because rainy season has come, the plant materials used in field trial were provided from university farm (academic business units)- IPB.

   Fertilizer > fertilizer NPK was bought according to the requirement and utilized for experimental forage species. The farmers prefer to use organic fertilizer obtained from their own farm. In Kuningan farmers use combination between cattle manure and chicken manure. The dosage of manure to be applied for forage is according to protocols.

   Blue drum for silage > 230 Blue drum for silage has been procured. The drums are managed by cooperatives. For inventory, the drums are marked by the name of cooperatives and numbered. Farmers can use (rent) the drums for making silage in their farms. Besides rent the drums, several farmers who join in the demo farm have purchased the same type of drum for additional silage stock.

   Manual Silage presser> this equipment was designed by the team together with farmers for compacting the corn stover when filled in the drums. This economical tools are very useful and make the corn stover filling easier and faster. At the beginning some farmers were doubtful using silage presser, but slowly they are habitual to the equipment. Farmers give any idea to enhance this tools. Two silage presser has been made and distributed to saluyu and cikajang.

   Grass/corn chopper> The chopper machine for chopping grass/corn stover is urgently required by farmers. The ordered chopper was made in Malang, and it will be tested in saluyu. One other chopper will be ordered in end of April 2016 after first chopper is tested in Saluyu. On 7th of April the new chopper was tested in the factory, and the results showed very good in chopping shape and production per hour. This chopper will be dedicated in Saluyu Cooperation.

3. **Student Companion**

   Students involved in this study are Ossy Rama and Veski Zunius (formerly were Fandy, but he unfortunately gets accident and he gets recovery very well now), who supervise and collect data in location and report any progress to main researchers. They stay not in farmer’s house because the distance among demofarms is too far. It is therefore they rent room for the students locates in the middle of demofarm’s locations.

4. **Field Trial for Introduced Forages**

   Field preparation and forage planting for both Saluyu and Cikajang were conducted on 10-12 December 2015 for Garut and 18-20 December 2015 for Kuningan, when the rain season was beginning. Forage species used in the field trials were *Brachiaria sp cv. Mulatto, Pennisetum purpureum cv. Taiwan, Setaria splendida, Pennisetum purpureum cv. Mott dwarf, Pannicum maximum, Indigofera zollingeriana, Stylosanthes guianensis, Glirisidia sepium, Calliandra*
While ordering the seeds from Barenburg, the plant materials for this trial were provided from IPB. The plants were planted in plots (with different plot size depended on soil availability and landscape condition). The number of individual plants per plots were the same for same species for every location.

The first trimming was conducted on 21-22 February 2016 for Garut (Cikajang) and 4-5 March for Kuningan (Saluyu). Growth and herbage production of the plants were evaluated. Meanwhile quality of herbage is being evaluated. During first periode (before first trimming) of production of the introduced forages, farmers visited and observed the growth and discussed among them. Students involved in this projects observed and recorded the growth (plant height and tiller number). We discussed with farmers and student about the nominated species that will be established in larger area. Evaluation on individual dry weight biomass production (oven 60 °C constant weight) showed as depicted in the Table below:

<table>
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<tr>
<th>Forage Plant Species</th>
<th>Dry weight herbage production (g/individual plant)</th>
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<tbody>
<tr>
<td></td>
<td>Kuningan (Saluyu)</td>
</tr>
<tr>
<td>Setaria splendida (60x60)cm</td>
<td>109,4</td>
</tr>
<tr>
<td>Pennisetum purpurhoides (100x100)cm</td>
<td>186,5</td>
</tr>
<tr>
<td>Brachiaria cv. Mulato (60x60)cm</td>
<td>262,3</td>
</tr>
<tr>
<td>Pennisetum cv. MOTT (100x100)cm</td>
<td>214,4</td>
</tr>
<tr>
<td>Pennisetum cv Taiwan (100x100)cm</td>
<td>380,5</td>
</tr>
<tr>
<td>Panicum maximum (60x60)cm</td>
<td>243,1</td>
</tr>
<tr>
<td>Calliandra calothyrsus (100x150)cm</td>
<td>-</td>
</tr>
<tr>
<td>Stylosanthes guianensis (30 cm between row)</td>
<td>-</td>
</tr>
<tr>
<td>Indigofera zollingeriana (100x100)cm</td>
<td>80,4</td>
</tr>
<tr>
<td>Glirisidia sepium (100x100)cm</td>
<td>-</td>
</tr>
</tbody>
</table>

DF : Demofarm

Individual herbage production of any species seemed to be lower in Garut than in Kuningan. This has to be checked with soil fertility (is being analysed). If the grass species are compared, Mulatto and Taiwan grass showed highest dry weight biomass production. Indigofera grew faster than other legum spekies (Glirisidia, Calliandra, Stylosanthes). This legume species can be trimmed at 70 days. The other legumes has not been viable to be trimmed. Sixty days after trimming, first cut will be conducted.
5. Farmer Training

The training for farmers regarding forage development in dairy farms were conducted twice during period of October-March. It was held on November 2015 and on 4-5 of February 2016 for Kuningan and 15-17 of March 2016 for Garut. The training topics were including Motivation (Achievement Motivation Training) by Mr Agus (national senior trainer, who is a experienced person in suggestion training), Corn cultivation methods by Mr Bagus (Pioneer Dupont) and silage making by Luki. Farmers were very enthusiastic in participating the training. This can be seen from their participation in practical work of silage making.

6. Silage Making

Silage making is actually programmed for next step of forage development in dairy farm (it is scheduled starting on June 2016). However, since the dry season is predicted starting on August 2016 and according to the objectives of this program (to increase use of high quality forages and reduce utilization of rice straw for feed), the silage making program is shifted in advance on February. The first try in silage making were on 7 of February 2016 in Saluyu (Kuningan). A farmer (pak Rakum), who had cultivated hybrid corn (pioneer SP21 from Dupont) provided about 3 tons of corn stover for initiating silage making practical work. The blue drums that had been procured were used as silo. Chopper was already provided by Dinas Peternakan province Jawa Barat, and silage presser equipment was design by researcher to make the silage making easier and faster. Farmers involved as Demofarm practiced and made silage by using available equipment. Equipment and methods will be fitted as a standard system in making silage in Saluyu and Cikajang. During practical work on silage making, important technical coefficient were found as follow: capability of farmer in Saluyu to fill stover into blue drum (filling capability) was in average 72 kg, time of filling 8 minutes, frequency of filling 3 times, stover filling rate 13.4 kg/minutes. Meanwhile capability of farmers in Cikajang to fill stover into blue drum was in average 74.7 kg, time of filling 7.2 minutes, filling frequency was 3 times, stover filling rate was 10.7 kg/minutes.

Silage making in Garut was conducted on 16-17 of March. The practical work was conducted in pak Ahmad Farm, who does not involve as demofarm, but he produce silage for their farm group. With his experience he trained other farmers to make silage. There are still some technique that have to be improved to make good silage. Pak ahmad used to make silage by using transparence plastic bags. The disadvantage of this methode are the plastic is easier to tear due to hard and sharp stem of stover and difficulties in compacting the stover. Problem of silage making in both case in Kuningan and Garut is chopping size and precision. This is due to unsharp blade of chopper knife. Renewing of the chopper knife is necessery.

7. Forage & silage Evaluation

Forage and silage quality evaluation is still being conducted. Samples are now prepared to be analysed. First demolition of silage in Saluyu was conducted on 7 of March. Organoleptically the silage was evaluate, and showed very good results, with greeny color, pH 3.9-40, dry, typical smells of vinegar. The farmers learned to rapid assesment of silage directly after opening the drum seal.

8. Initiation of Forage Business:

As planed in the project proposal, to sustain high quality forage availability for dairy farm, initiation of forage business activities and institution is conducted. As the initial stage, feasibility study of Indigofera (as high resource protein commodity) has been developed and so far the
business plan has been done and communicated to relevant institution like state owned company that operates surrounding dairy cooperatives. For silage, the feasibility study will be conducted in May. For this an expertise from social economics is required. Business initiation for Indigofera has been conducted together with PTPN, BUMN Hijau Lestari, Yayasan Bulog and KPSBU Lembang. Meanwhile silage business plan has been discussed with cooperatives management, and the management decide to involve as initiating unit for building silage center. It is targeted to implement forage business in the year 2016. Once the feasibility study is completed, communication with finance institution could be initiated.

Obstacles and Problem Solving:

1. **Land availability for forage production**
   Production of selected forage has started to produce herbage for next coming feeding trial in demofarm. Land owned by farmers for growing forage are limited. Most of farmers use their own land for growing food crops such as corn (peeling corn seed), cassava, rice, vegetables. As the field trial program began, farmers provided land for introduced forage trial. At this stage the land for introducing forage program with small plots are available. For the next step, growing Taiwan napier grass, Mulatto and Indigofera needs 1000 m$^2$. A demo farm in Cigeureung Saluyu and Pasir Pogor Cikajang provide land. Planting of the three forage species has been conducted in the middle of March 2016 in Cigeureung demofarm. The next planting activity for forage production in Pasir pgor will be innitiated with nursery of Indigofera and growing Taiwan grass, Mulatto and corn. Farmer group of Pasir Pogor provide land for forage about 2 ha. It is expected that the forage will be available for feeding trial.

2. **Limited supporting equipment**
   Forage chopper and other equipment for silage making are very limited in the demofarm. There is a need of farmer to utilise equipment to make silage easier. In this project procuring blue drum for silo, chopper and silage presser are helpfull very much for demofarmer. After practicing silage by using equipment, farmers eager to provide blue drum silo for their self. In the planning chopper will be provided for both Saluyu and Cikajang cooperatives.
   One of farmer (Pak Juarman) in Parigi Saluyu tried to make silage in stak silo, that had been made from woods by the farmer. However the results of silage was not good due to less compaction and trapped oxygen in the silo. He has difficulty to compact chopped corn stover. For this kind of silo we still find an appropriate method. The other farmers prefere to use blue drum for more practice silage making.

3. **Farmer knowledge and forages awareness are very vary**
   At the beginning of this project, most of farmer in the group use rice straw, which is very low in quality. About 23% of farmers know 5 species from 9 introduced forage species, and more than 70% of them do not recognize 7 species of introduced forage. During initiating the field trial farmers tend to wait and see, how the introduce forage look like and contribute to forage availability in their farm. Introducing forage in different species became an entry point to attract farmer’s attention and awareness on forages. Training of forage cultivation and silage making has changed in general farmer’s knowledge (deep evaluation on farmer knowledge has not been conducted.)
4. **Economical valuation are needed for silage**
   There are many critical question come from farmers. One of the frequent question is: “can the coop or a unit produce silage, so that we can by the silage from coop?”. This question can be answer when coop or a business unit are sure that silage business make profit. For this reason a feasibility study reagarding silage business has to be conducted, and related expert is required.
   Meanwhile, feasibility study for Indigofera business has been developed since last 3 years. This information is very important for company (PT BUMN Hijau Lestari, Yayasan Bulog, PTPN, Perhutani) that is interested in Indigofera and silage business. Besides, a financial institution like Rabo Bank is waiting for the feasibility study.

5. **Need more active role from Cooperation**
   To enhance and succes the program, in particular regarding to silage and forage program, supporting of cooperation management are required. The supports is basically needed for constructing silage business unit in cooperation. Discussion with management has been initiated to find out the clues and step of running silage and forage business.

**Future Planning :**

1. Extensify silage making and Training for consolidating silage center
2. Extensify production of selected forages (producing more forage for feeding trials)
3. Extensive nursery for Indigofera
4. Production of Indigofera for protein suplement by farmer & collaboration with PTPN
5. Evaluation of production and quality of selected forages
6. Feeding trial combined with introduced concentrate
7. Protocol for feeding trial
8. Leaflet printing of prospective forage species
9. Feasibility study for silage business

**FARMERS IN ACTION**

**FIELD TRIALS : LAND PREPARATION, PLANTING, OBSERVATION AND HARVEST**

Soil pH Checking and plot preparation
Fertilization and transplantation of introduced forage species

Planting experimental forage species in Saluyu – Parigi & Cigeureung

Planting experimental forage species in Cikajang – Pamegatan
Planting experimental forage species in Cikajang – Sumadera and Pasir Pogor

Indigofera a month after planting in Cigeureung, Parigi and Pasir Pogor, growing faster than other introduced legum species

Pennisetum cv Taiwan a month in Saluyu and Cikajang

Pennisetum cv Taiwan two months in Saluyu and Cikajang grow very fast and accumulate high dry matter
Brachiaria cv. Mulatto produces more tiller in Saluyu and Cikajang

Benggala grass (P. maximum) in Saluyu and Stylosanthes in Cikajang grow well

Setaria grows well in Saluyu and Cikajang. Student were observing the plants
Farmers are harvesting Setaria and Mulatto

Farmers are harvesting Indigofera in Pasir Pogor and Gunung Keling

Preparation of sampling and observation Pennisetum cv. MOTT
The farmers wrote their idea to improve dairy cows productivity.

Building teamwork in farmer groups, effective communication.

Sharing idea and learning to detail works and patient, together they can do successfully.
Farmer practices how to solve a tricky problem and make everything possible

SILAGE MAKING PRACTICAL WORK

Farmer excursion to Majalengka (about 60 km from Kuningan) to learn corn cultivation to experiencing farmers in Majalengka. The tutor is pak Bagus from Pioneer-Dupont

Farmers training for corn cultivation in Saluyu and silage making
Discussion and consultation together with farmers in the field. A farmer tried to build stack silo from woods. They find difficulties to build the silo, and they recommended not to build as such silo due to ineffective in filling and air tightness.

Corn plants cultivated by pak Rakum demofarmer in Saluyu using hybrid corn

Farmers learnt how to recognize a proper age and water content of corn stover
Farmers learnt how to proceed chopping and produced proper chopping shape and size.

By using silage presser designed together with farmer, making silage is now faster.

Every farmer tried to compact the corn stover into blue drum.
Weighing silage and then date recorded

Achievement Motivation Training in Cikajang and corn stover preparation

Old and new chopper (procured by this project)
Farmer filled silage into drum

Using silage presser to compact the corn stover. Saluyu and Cikajang have their own silage presser procured from this project

Numbering silo and recording the date of silage filling