Technology Fact Sheet for Adaptation

Technologies in the animal husbandry

B.6. Producing supplement forage with bacterial enzymes for livestock [i]	
1. Introduction	There are about 2600 plants growing in pastures of Mongolia and 600 of them are eaten by livestock. Pasture biomass varies greately due to natural zones and seasons. Especially in winter, pasture biomass decreases significantly, its nutrient content is reduced by about 50-70%, protein by 60-70% compared to summer. Therefore, animals can not graze sufficient forgae, and lose 25-30 % of live weight, sometimes die. For example, about 10.2 million animals died in the winter of 2010. Cellulose in supplemental forage for ruminant animals break down in intestines and methane and carbon dioxide are released. Cellullose in pasture plants increase by 30-40% in winter and spring. Also straw which is used for animal forage has high amount of cellulose. So, supplemental forage should be enriched with enzymes in order to increase digestibility and reduce methane release.
2. Technology characteristics	Bacterial substances and enzymes would be produced by raising local varieties of bacteria which disintegrate cellulose. It would be used to produce forage with low cellulose and high protein through processing of agriculture secondary products by environment friendly technology. The technology can be introduced in any area of the country. Initially, bacterial enzymes would be produced by professional organizations and experts. Dosages for animals should be determined. Then local residents would be trained on application. Finally they would be able to enrich animal forages with the enzymes. After the technology diffusion, forage production using straw and other available materials would be increased. Livestock production would be increased and animal deaths would decrease.
3. Country specific applicability and potential	Environmentally friendly forage availability for animals would be increased due to processing of agricultural residue products or low palatable plants. Herders' income would be increased since animal production is increased. Eventually, food security would be improved. The factory would produce bacterial enzymes and supply them to herders. Application instructions should be developed and provided to customers. When results are demonstrated and confirmed, other factories can be established in local areas. The technology diffusion requires 3-4 years to implement in all soums and aimags.
4. Status of technology in country	The technology is being piloted in a project of International Agency of Nuclear Energy in Mongolia.
5. Benefits and impact on the country	This technology would allow the creation of jobs. However, fermenting and other techniques are needed to be procured from other countries. The technology solutions and methodologies are developed in detail

development ✓ Economic (- Job creation; - Investment) ✓ Social (- Income generation; - Education; - Health) ✓ Environmental	due to science and technology projects, so internal resources would be deployed. The technology would allow improvement in animal production and quality. Consequently, herders' income would be increased and livelihoods would be improved. Researchers' experiences and capacity will be expanded. Human health would have positive impact due to usage of high protein food. Plants with low importance which are a result of pasture degradation would be used for forage. Also greenhouse gas (methane) emissions would be reduced due to changes in the oxidation process in intestines of ruminant animals processing of straw and other residue materials.
6. Climate change adaptation benefits	As a country with a harsh and continental climate, long cold winter and spring and nomadic livestock, supplemental forage is essential and green house gas (methane) from ruminant animals can be reduced due to the technology.
7. Financial Requirements and Costs	Factory of bacteria production would require about 800,000 USD. 50% the total cost can be from international funding 40% from the state budget 10% from enterprises and individuals.
8. Institutional requirements	Residents and herders need extensive awareness about the benefits, and skills for producing forage need to be transferred. There might be some challenges in some areas because the technology is just being piloted. For example, in good winters, herders do not feed their animals. However, they need to be trained to do so.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment For Climate Change Adaptation– Mongolia. You can access the complete report from the TNA project website http://tech-action.org/**