

Molasses blocks for livestock can fight climate change & reduce smallholder farmer poverty



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High-quality nutrient molasses block supplements for cattle & buffalo in developing countries can address rural poverty & climate change

A Strategy for Improving the Production Efficiency of Cattle

Why are GHG's from livestock important?

Mitigation of climate change, through reduction in the use of fossil fuels for energy that produce greenhouse gas (GHG) emissions, is a priority challenge for the survival of mankind. However, with the contribution of GHG's from livestock generally considered to be ~16% of total emissions, their reduction from the almost one billion cattle used in food production has also become an important priority. Currently, livestock production accounts for ~40% of agricultural output in developed countries, with advanced genetics, feeding systems, animal health controls and other technologies reducing land requirements for livestock by ~20% with a doubling of meat production over the last 40yrs. However, in subsistence agricultural systems of developing countries, livestock production is only ~20% of agricultural output. This is despite many of these countries having a largely agrarian society with rapidly rising demand in urban areas for milk and meat in countries where there has historically been very limited access to these protein sources (<http://www.fao.org/news/story/en/item/1157729/icode>).



Image 1. The productivity of forage feeding of cattle in stalls in Laos outperforms that of grazing cattle

With global meat and milk production projected to increase another 19% and 33% by 2030, respectively, improved adoption of existing 'best practice' technologies in feeding, health, husbandry, manure management and marketing is required. It has been estimated this could potentially help the global livestock sector reduce GHG emissions by as much as 30 percent. However, the challenge of doing in this in developing countries with farmers of generally low animal husbandry skills and high rates of illiteracy, is extremely challenging.

How can research solve the low livestock productivity levels in developing countries?

Fortunately, applied field research studies conducted in Laos and Cambodia from 2007 until 2020 (<https://mekonglivestock.wordpress.com>) offers a solution to address this low productivity in the smallholder

large ruminant husbandry systems in developing countries. The research has now developed a strategy that delivers major improvements in cattle and buffalo production efficiency that potentially reduces GHG emissions by enabling more meat to be produced per cow from fewer but healthier more productive animals.

Research, largely supported by the Australian government (<https://aciar.gov.au/project/AH-2006-159>; <https://www.aciar.gov.au/project/AH-2012-068>) aimed to improve food security and rural community resilience, through enhancing the livelihoods of smallholder farmers. These are farmers that have traditionally kept large ruminant animals for draft for rice production, but were now retained mainly as a wealth 'bank' and sold when cash was required. However, this resource has generally been poorly managed, with inadequate feeding and exposed to high risks of disease, especially Foot & Mouth Disease (FMD) and Haemorrhagic Septicaemia (HS). Thus, project entry points were those interventions considered capable of motivating farmers to improve their nutrient base and reduce losses from disease of their large ruminants.

What the research tells us about a whole of village intervention

In project sites in both countries, the initial establishment of forage plantations, with whole of village large ruminant vaccinations plus endoparasite control by deworming, were introduced. This improved the condition and value of cattle for sale and prevented major disease outbreaks and underperformance from parasites. Although the expanding forage plantations took several years to impact on village-level productivity, they eventually resulted in average daily gains (ADG) across the village large ruminant population that were 2.5x (150g) those in villages without forages (50g). Higher gains were observed in target-fed animals. In Cambodia, the preferred forages were Mulatto, Marandu & Stylo spp. Feeding forages for 104days resulted in an ADG of 190g compared to a loss of 4g in non-target fed cattle. In Laos, the preferred forages were Nipah, Ruzi & Stylo spp. Stall-feeding of forages to cattle for 120days resulted in an ADG of 320g, compared with the ADG in grazing animals of between 40-80g (Image 1).

Subsequent trials examined the supplementation of animals for 84days with molasses blocks. The trials examined use of non-medicated (NMB), 8% urea-medicated (UMB), or anthelmintic-medicated blocks containing triclabendazole (TMB) or fenbendazole (FMB) at therapeutic or sub-therapeutic doses. Again, consistent elevations in weight and AGD from extended access to blocks occurred.

As animals at different ages will respond differently to supplementation, a trial providing access to UMB blocks examined the ADG'S in calves <8months of age, growing cattle 8-24months and lactating cows.



Image 2. A buffalo cow ingesting a high quality-nutrient molasses block for supplementation of her forages intake

Results in ADG after 84day access to UMB found the highest ADG in calves <8months of age (much of this presumed to be from milk from their dams), followed by growing calves 8-24months and lactating cows, of up to 265, 237 and 190g, respectively. Because of vaccinations and parasite control, no mortalities were recorded in any of the trials. Provision of TMB resulted in an ADG of 201g compared to an ADG of 124g from NMB and 94g in control animals. Access to FMB resulted in an ADG of 200g whereas NMB had the highest ADG at 230g, with both

exceeding that of control calves at 170g ($p=0.002$). Both TMB, FMB and UMB treatments were associated with significant reductions of parasite eggs per gram of faeces (EPG) in cattle relative to control calves ($p=0.007$).

It was evident that the intervention of providing high quality molasses blocks, readily addressed dry season productivity limitations and issues of widespread endoparasitism, particularly where efficient delivery of anthelmintics for control of the endemic liver fluke *Fasciola gigantica*, the calf roundworm *Toxocara vitulorum*, and other helminth parasitic infestations, was challenging. All farmers participating in the trials were keen to purchase the blocks. They confirmed their animals were healthier, coats shinier, mortalities were absent, animals were easier to manage, and their livestock values were greater (<https://thebpp.com.au/partnership/enhancing-livelihoods-of-smallholder-farmers-in-laos>).

What do we conclude from this work and what next?

This research concludes that nutritional and health interventions, including the addition of high-quality molasses block supplementation, is a practical and efficacious livestock management strategy, capable of significantly improving tropical smallholder livestock production efficiency, in the order of 2.5 to 5x ADG. Molasses blocks are a potentially important additional project entry point intervention. They motivate farmers to improve their cattle and buffalo production, address the extended lag period when forage plantations are being established, especially in dry seasons when nutrition is limiting, and in developing countries where lack of cattle handling equipment means administration of medication is difficult.

As molasses blocks, forages and health interventions deliver superior productivity for smallholder large ruminant production in developing countries, potentially reducing GHG emissions, 'scale-out' of this strategy is advisable and under development (<https://www.agcotechglobal.com>). A major improvement in smallholder ruminant production efficiency that can reduce GHG's from cattle production in developing countries is achievable with this multi-intervention strategy. Applied efficiently, this strategy will likely create both major socioeconomic benefits that improve resilience in some of the poorest of rural communities, and reduced GHG's from livestock that diminishes the risk of the impending climate change catastrophe.

Summary: The 3-step intervention strategy for optimizing smallholder cattle production efficiency:

1. Whole of village vaccination for HS & FMD plus parasite management
2. Establish high performance forage plantations
3. Introduce high-quality nutrient molasses blocks



Image 3. Sale of high-quality nutrient molasses blocks for cattle & buffalo is now occurring in Laos