**Technology Fact Sheet for Mitigation**
**Sector: AFOLU**
**Sub sector: Livestock (Enteric Fermentation)**
**Technology: Ration Modification for Livestock** [i]

## A.1 Introduction

Ruminant animals have a unique digestive system. Ruminants possess a rumen, or large fore-stomach, in which microbial fermentation breaks down coarse plant material for digestion. Enteric fermentation enables ruminants to eat plant materials, but also produces CH4. During digestion, microbes present in an animal's digestive system ferment food consumed by the animal. This microbial fermentation process is referred to as enteric fermentation and produces CH4 as a by-product, which can be exhaled or eructated by the animal. The amount of CH4 produced and excreted by an animal depends primarily on the animal's digestive system and the amount and type of feed it consumes. Modified Ration feed is a technology that can reduce the methane production in the natural enteric fermentation process through Inhibition of methanogenesis stage in the digestion process or through reducing methane emission per kg of animal. This material includes:

• Halogenated compounds inhibit the growth of methanogenic bacteria (the bacteria that produce the methane), but their effects can also be transitory and they can have side-effects such as reduced intake.
• Condensed tannins, saponins, or essential oils. However, adding such compounds may have the negative side-effect of reduced digestibility of the diet.
• Hormonal growth implants do not specifically reduce methane emissions in itself, but by improving animal performance, they can reduce emissions per kg of animal product.

## A.2 Technology characteristics

An animal's feed quality and feed intake affect $CH_4$ emissions. In general, lower feed quality or higher feed intake lead to higher $CH_4$ emissions. Feed intake is positively related to animal size, growth rate, and production (e.g., milk production, wool growth, pregnancy, or work). Therefore, feed intake varies among animal types, as well as among different management practices for individual animal types. As $CH_4$ emissions represent an economic loss to the farmer—where feed is converted to $CH_4$ rather than to product output then mitigating this emission is also farmer interest. This can take place either through replacing forages with the feeding which reduce quantity of gas emitted or through concentrates which may reduce the daily methane emissions /kg of animal. Feeding concentrates' benefits depend on whether the number of animals can be reduced or whether slaughter age can be reduced. In addition, it is important to consider how the practice affects land use, the nitrogen content in the manure and the emissions from transporting and producing the concentrates in the first place. In general the technology requires control over feed rations so it is more applicable to closed systems.

## A.3 Country specific / applicability

Sudan has large wealth of livestock estimated to be 130 million head, out of which is 40 million head of cows. The contribution of enteric fermentation is significant estimated by 1,713 Gg of $CH_4$.

**A.4 Status of technology in country**

Ratio control is practiced for different purposes such as increasing dairy production but there is no significant application targeting reduction of GHG.

**A.5 Barriers**

• Limited Technical know –how
• High upfront Cost
• Open husbandry system which is prevailing in Sudan

**A.6 Benefits to economic / social and environmental development**

From the literature the socio-economic development and environmental protection contributions are as of yet not clearly quantified. However in the IPCC (2007) it appears that there is an economic benefit of improved feeding practices as efficiency increased in the livestock management system. The other aspects are uncertain and require more investigation.

**A.7 Cost**

It is difficult to enumerate the cost of mitigation because the diet manipulation options to reduce CH4 emissions from enteric have costs that are subject to feed market instability. Furthermore, the availability of certain feed or oil types will vary by region and season in some, so it would be difficult to assign cost on a national level for diet manipulation.

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