STEP BY STEP FORMULA

July 2020

STEP 1:
Sourcing the Lemongrass

The **main ingredient** for our supplement is lemongrass leaves *(Cymbopogon citratus)*. In cattle, lemongrass has been shown to manipulate the digestion process and improve nutrient utilization, thereby reducing methane formation. Specifically, lemongrass contains bioactive compounds with antimicrobial and antiprotozoal properties which can be used to modify rumen fermentation. *(Gagan-Shah et al. 2016, Kumar-Singh et al. 2018, and M. Joch et al. 2016)* In our research, the lemongrass supplement was shown to reduce methane emissions by up to **33%** on average in the last three to four months of the cow's life. When sourcing the lemongrass, ranchers must ensure they are sourcing the leaves, which have these nutrients and plant properties we're looking for – not the stems.

The type of lemongrass used is important! We tested two types of lemongrass *(Cymbopogon citratus and Cymbopogon martini)* and learned that the chemical composition and polyphenols content of **Cymbopogon citratus** is better suited to achieve methane reductions. *The Cymbopogon citratus* should be harvested at the time when ether extract content (essential oils concentration) and total polyphenols content are the highest.

This type of lemongrass grows year-round in tropical, subtropical, and Mediterranean climates worldwide. It's been proven that this plant has beneficial effects like antiseptic, anti-fever, anti-dyspeptic, antioxidant, antinociceptive, carminative, and anti-inflammatory.

Sourcing Lemongrass Sustainably

We know that other feed commodities such as soy and corn are linked with sustainability challenges such as deforestation, pesticide pollution and others. The area of lemongrass under cultivation is currently smaller than would be needed to become a reliable feed for a portion of the beef industry, meaning its growth on a commercial scale needs to be greatly increased. Burger King wants to ensure that we are sourcing lemongrass and expanding its commercial production sustainably. Thus, we will make sustainability a key aspect of our conversations with lemongrass suppliers. We ask those who will also experiment with the Cow's Menu formula to do the same and share their learnings.

STEP 2:
Drying the Lemongrass

Fresh lemongrass leaves need to be dried to facilitate processing. Ideal conditions for the drying process are as follows:

- **Time to Dry:** 3-4 weeks
- **Light:** Drying must occur away from direct sunlight – preferably indoors – to prevent denaturalization of the bioactive compounds that may be responsible for the reduction of methane formation.
- **Temperature:** 18-20 oC (64.4-68 oF) – Temperatures above 40 oC (104 oF) are particularly harmful to the bioactive compounds and should be avoided.
- **Humidity Levels:** Low; Under 45%
- **Ventilation:** Plants should be stored in a well-ventilated area, spread on fine metal mesh racks placed away from the floor
- **Maintenance:** Plants should be rotated once or twice per week to prevent mold or fungus formation

(Luna-Solano et al. (2019)

The goal is to reach a dry matter content of 90%, at which point the leaves will have lost their green color and turned a yellowish brown. We recommend measuring this with a sample of the lemongrass in an air forced drying oven.

During our Mexico research, the lemongrass was dried for 8 weeks at 22 degrees Celsius and 25% humidity.

STEP 3:
Chopping the Lemongrass

Once dried, the lemongrass needs to be chopped. Chopping the lemongrass is key to facilitate mixing into the cattle feed. Some cows do not like the taste of lemongrass, but once mixed with the feed the cows eat it along with their normal feed.

We recommend using a hammermill to chop or mill the lemongrass to 0.5-1.0 cm size. In this form, the lemongrass can be stored away from moisture in air-sealed containers for several months. No refrigeration is needed.

STEP 4:
Mix and Feed

The dried and chopped lemongrass is added as a supplement. This means that it is additive to cattle's current daily intake – not in place of anything. In our research we fed the supplement during the last three to four months of the cows' lives.

We fed a diet composed of 80.6% concentrate and 19.4% forage with the following ingredients, though ranchers can continue to use their existing daily feed if preferred.

- **68% steam-flaked corn**
- **9.7% alfalfa**
- **9.7% oat hay**
- **5.7% soybean meal**
- **4.9% molasses**
- **1.9% protected fat**

On top of that daily feed, ranchers will add a supplement of 100 grams of lemongrass dry matter per cow per day.

Mixing is imperative to ensure the animals eat all of the lemongrass supplement. To disguise the flavor of the lemongrass, it needs to be thoroughly mixed with the rest of the feedstuffs of the diet to form a total mixed ratio (TMR). TMR is a method of feeding cows that combines feeds formulated to a specific nutrient content into a single feed mix.

Since implementing this type of feed additive is well-suited for controlled feeding, Burger King tested Cow's Menu in fed animals. Ideally, feeding the supplement during the whole life of the animal would reduce the overall amount of methane emitted, which is a continuous process over their lifetime. Our supply chain partners will test the feeding of lemongrass over longer periods and Burger King will report on outcomes of these pilots periodically.

Benefits and Changes for Farmers and Ranchers

Increasingly, consumers are putting pressure on companies like Burger King to offer sustainable options, and those companies are looking for suppliers who can support them in becoming more sustainable. We also hope that making efforts to reduce the environmental impact of beef production will help improve consumer perceptions of the beef industry overall. Further, in the context of evolving climate regulations, such as those in California who are mandated by law to cut methane emissions by 40% of 2013 levels by 2030, Cow's Menu offers a relatively low investment solution.

We recognize that there will be some additional steps ranchers face when introducing lemongrass as a feed additive. We list those below:

- **Identifying lemongrass suppliers who can easily transport or export to ranchers' locations**
- **Buying and storing lemongrass in bulk, given the significant among of lemongrass in feeds per day**
- **Adjusting feed processes to incorporate the lemongrass additive**
- **As needed, investing in infrastructure to dry, chop, and store the lemongrass**
- **Monitoring any effects of the diet on the cows and meat quality**

We understand that implementing this new practice means a change in ranchers' regular processes. We also recognize that more research is needed on the impact of the lemongrass additive on farm economics and effects on cows. Initial study results show that the lemongrass diet does not cause negative effects on animal performance, as long as the dose remains 100g of lemongrass per 10kg of feed per day. As we expand this formula with more suppliers, we hope to provide robust insight on commercial metrics such as weight gain, feed conversion ratio, days to slaughter, costs, and lemongrass price changes with increased demand. We also intend to share more research to facilitate implementation and inform longer-term viability.

Ultimately, we believe the hurdles to implement Cow's Menu are relatively low considering the potential benefits of the outcome: up to 33% reduction on average of methane emissions per cow during the period the supplement was fed (3–4 months in our research), which suggests lower-carbon-footprint cattle production, and the ability to respond to consumer interest in more sustainable food options.

For additional information on the Cows' Menu initiative, please reference our FAQs.