**RE-VET**

 **Gut-Heal**

**Pain in fresh cows:**

**Common health and management issues for fresh cows (cows that have recently given birth):**

1. **Milk fever (hypocalcemia) -** Low blood calcium levels that can cause paralysis and death if not treated quickly. More common in older cows.
2. **Retained placenta -** Failure to expel fetal membranes after calving. Can lead to metritis if membranes become infected.
3. **Metritis -** Infection of the uterus, usually occurring within a week after calving. Causes fever, dullness, and reduced appetite.
4. **Mastitis -** Inflammation of the mammary gland, often caused by bacterial infection. Results in abnormal milk.
5. **Displaced abomasum -** When the abomasum (fourth stomach compartment) fills with gas and moves out of position. Requires emergency surgery.
6. **Ketosis -** Low blood sugar and low appetite causes fat to be broken down too quickly. Causes ketones to build up in blood.
7. **Poor milk letdown -** Reduced oxytocin release can impede milk ejection and cause cows discomfort.
8. **Lameless/injury -** Stress of calving can lead to sole ulcers, hoof infections, strained muscles, etc.

**Gut-Heal benifits**

**Ruminal microbes’ byproducts and exogenous enzymes:**

1. Provide good fibrous digestion and enhance energy production.
2. Microbial byproduct and exogenous enzymes Improve ruminal ecosystem and digestion especially ADF and NDF With subsequent increased milk yield per unit of dry matter intake and milk protein yield per kilogram of crude protein intake.
3. Additionally, the somatic cell count in milk decreased in enzyme supplemented cows.

**Ruminal buffers, alkalizing agent and calcareous marine algae:**

1. Provide phase release buffers and maintain ruminal pH at optimum range.
2. Na bicarb., Mg oxide, Ca carb., Ca oxide Buffers and alkalis, help in resist changes in rumen pH when high grain, restricted roughage, fine chopped and fermented forage (silage) are fed.
3. Calcareous marine algae Improve fiber digestion, VFA acetate: propionate ratio for enhanced DMI, Milk fat percentage and over all milk yield

**Essential oil extracted from herbal plant with trace amount:**

1. Improve digestion, decrease methane, emission and ammonia production.

Saponins

●Decrease deamination in the rumen and reduce HAP bacteria activity

● Improve VFA production, especially propionate (C3)

●Improve immune system (cell mediate) + Essential oils

●Modulate rumen micro flora (reduction of HAP)

●Reduce protozoa activity (defaunation) and improves microbial protein efficiency and decrease methan émission

**Pungent substances and saponin:**

1. Increase of intestinal digestive, enzymes include antioxidant one, and improves protein, starch and fat digestibilityand metabolic processes specially during heat stress.Increase of intestinal digestive enzymes and improves protein, starch and fat digestibility

●Increase salivation, buffer production, and improve urea and buffer recycling

● Activation of blood circulation and metabolic processes specially during heat stress

**In General:**

| **Health Issue** | **Interventions** |
| --- | --- |
| **Milk Fever** | **- Calcareous marine algae and alkalizing agents for calcium homeostasis and preventing hypocalcemia. Optimal rumen pH for overall health.** |
| **Retained Placenta** | **- Saponins for immune modulation.- Pungent substances for promoting healthy blood circulation and aiding uterus healing.- Essential oils for general immune support and anti-inflammatory effects.** |
| **Mastitis** | **- Saponins for improved immune function.- Essential oils for natural antibacterial properties.- Higher milk quality based on lower somatic cell counts.** |
| **Displaced Abomasum** | **- Optimizing rumen health and digestion efficiency with enzymes and essential oils to prevent gas buildup and abomasum displacement.** |
| **Ketosis** | **- Enhanced energy production and fiber digestion to prevent excessive fat breakdown and ketone formation.- Higher propionate production for modulating glucose/insulin function.** |
| **General Improvement** | **- Better nutrient digestion.- Anti-inflammatory effects.- Higher feed efficiency.Optimized rumen fermentation.- Circulating antioxidants.** |

**Milk Fever**

**How Gut-Heal the calcareous marine algae and alkalizing agents in the product could help prevent milk fever in fresh cows:**

* Milk fever (parturient paresis) is caused by low blood calcium levels (hypocalcemia) that occur around the time of calving. This is triggered by the **sudden demand** to produce large volumes of **calcium-rich colostrum and milk**.
* Calcareous marine algae **provide highly bioavailable calcium carbonate** that can rapidly elevate blood calcium levels when consumed. The algae contain up to **20-30% calcium** carbonate that dissociates in the acidic abomasum to provide calcium ions for absorption. Research shows feeding as little as **23g/day** of the algae significantly boosted blood calcium.
* Meanwhile, alkalizing agents like sodium bicarbonate, magnesium oxide, calcium carbonate etc. help optimize **rumen pH between 6.2-6.8**. This pH allows cellulolytic bacteria that digest fiber to thrive. Their fermentation production of acetate and butyrate provides key energy sources for the cow post-calving. It also prevents **subacute ruminal acidosis.**
* By preventing **acidic rumen conditions**, the alkalizing agents also support greater prehension and chewing of feed. This stimulates **saliva production** - the cow's natural source of bicarbonate buffers. Higher rumination increases blood calcium absorption from the saliva as well.
* Together, the **direct calcium source from algae and optimized rumen pH work synergistically**. The alkalizing agents allow the cow to better utilize calcium from marine algae and saliva to meet her sudden milk demand. This prevents the **drastic drops in blood calcium that lead to milk fever**.

**Retained placenta**

**how the Gut-Heal ingredients could help prevent retained placenta and metritis in fresh cows:**

* RP & Metritis occurs when the **fetal membranes fail to detach** from the uterus after calving. This **necrotic tissue** then allows bacterial invasion and infection of the uterus (metritis).
* **Saponins** likely help prevent these conditions by **modulating immune function**. Dietary saponins **boost cell-mediated** immunity by increasing **antibody production**, **cytokine activity**, and **lymphocyte proliferation**. Specific **immunoglobulins like IgG** are crucial for clearing **placental membranes post-calving**.
* Meanwhile, pungent substances **like ginger, garlic, and chili peppers promote** healthy inflammation and blood flow. The compounds gingerol, **allicin, and capsaicin enhance peripheral circulation.** This helps **slough off** and expel placental linings by improving **uterine contractions and drainage**.
* The combined anti-inflammatory effects and improved **uterine tone prevent** bacteria from **infiltrating and infecting** the uterine lining itself. For any existing contamination, **the essential oils' natural antimicrobial activity** would also fight infection. **Oregano, thyme, turmeric oils can even disrupt bacterial biofilms.**
* By stimulating systemic immunity, increasing uterine circulation, preventing infection, and allowing prompt **involution** - the product's saponins, pungent compounds, and essential oils **address major risk factors** for retained placenta and metritis in fresh cows.

**Mastitis**

**how the Gut-Heal could help prevent mastitis in fresh cows:**

* Mastitis is udder inflammation typically caused by bacterial intramammary infection (IMI). Gut-Heal can reduce mastitis risk in two key ways:
1. **Enhancing immune function to resist IMI:**

Dietary saponins boost overall immune activity including increasing **antibody production, cytokine signaling, and lymphocytes counts.** Specific immunoglobulins like IgG, IgA, and IgM in mucosal areas like the mammary gland prevent pathogen invasion.

This immune stimulation is also supported by the **essential oils that upregulate protective genes involved in antioxidant response, detoxification, and cellular regeneration.** With higher immunity, cows have greater resistance to staphylococci, streptococci and other mastitis-causing organisms.

1. **Direct antimicrobial properties:**

Various **essential oils have well-established antibacterial, antiviral, and anti-fungal properties** against specific mastitis pathogens. Oregano oil for example, contains **thymol and carvacrol compounds that damage bacterial cell walls and prevent replication of common culprits like Staph aureus.**

With both enhanced host immunity against IMIs and direct inhibition of pathogen growth, the key risk factors are **mitigated**. This reduces likelihood of intramammary infections that lead to mastitis in fresh cows during early lactation.

**Displaced Abomasum**

**How the Gut-Heal could help prevent displaced abomasum (DA) in fresh cows:**

**A displaced abomasum occurs when the abomasum fills with gas, causing it to rise up to the rumen and twist out of place. This blocks passages and requires surgery.**

Several ingredients in **Gut-Heal** work to **optimize rumen conditions and prevent gas buildup** that could cause DA:

1. **Essential oils and saponins modulate rumen microflora.** They selectively inhibit gas-producing bacteria and archaea like methanogens. At the same time the remaining microbial community becomes more efficient at converting substrates to VFAs rather than gases.
2. **Enzymes and calcareous algae** enhance fiber digestion and nutrient use. I**mproved breakdown of structural carbohydrates prevents undigested particles from fermenting into gas.** More VFA production also maintains optimal pH.
3. **Rumen buffers** like **sodium bicarbonate and MgO help stabilize ruminal pH between 6.2 - 6.8.** This prevents fluctuations that change **microbial populations and fermentation** patterns associated with gas accumulation.

Additionally, **the pungent compounds** improve digestive efficiency and metabolism overall. Healthier GI function and nutrient assimilation mean the cow’s energy demands are being adequately met by the diet without relying on fat breakdown that releases gas.

By optimizing feed utilization, controlling rumen conditions and microbes that produce gas, while meeting the **cow’s energy needs - the combined effect of the product ingredients help prevent abomasum displacement in fresh cows.**

**Ketosis**

**how the Gut-Heal could help prevent ketosis in fresh cows:**

**Ketosis develops when the cow breaks down fat reserves too quickly to meet energy needs for high milk production. This releases ketone bodies that accumulate in the bloodstream.**

Several key ingredients in the product help prevent this excessive fat mobilization:

1. **Enzymes & algae improve fiber fermentation and total digestibility.** More complete feed utilization means more usable VFAs are generated through carbohydrate digestion rather than fat catabolism. The higherenergy production satisfies requirements.
2. **Essential oils and saponins shift volatile fatty acid production to favor propionate**. Propionate is glucogenic - meaning it can be converted to glucose for energy use. Higher glucose synthesis this way alleviates the need for fat breakdown to support glucose demands.
3. **Calcareous marine algae provide highly bioavailable calcium and magnesium that assist in enzyme functions** related to carbohydrate metabolism and lipid regulation. Optimal mineral status prevents dysfunction driving ketosis.
4. **Supplying more usable calories from the diet through enhanced digestion** prevents the cow needing to tap into adipose reserves. This leaves body fat stores intact rather than elevating circulating ketones.

Overall, by optimizing **feed energy yield and nutrient digestion - the ingredients coordinate regulation of glucose, insulin, adipose turnover, and ketogenesis** to avoid metabolic imbalances. Minimizing fat mobilization this way helps prevent ketone accumulation.

**Poor production**

**Milk letdown refers to the ejection of milk from the alveoli in the mammary gland to the teat cistern so it can be removed. This is triggered by the hormone oxytocin. Stress around calving can disrupt signals to release oxytocin.**

Specific ingredients can optimize oxytocin flow and receptivity:

1. **Essential oils act directly on the hypothalamus - stimulating oxytocin secretion** from the pituitary gland. Increased circulating oxytocin then binds receptors on myoepithelial cells surrounding alveoli to contract and eject milk.
2. **Gingerols and capsaicin in the formula also stimulate blood flow and warmth**. This enhances activation of the letdown reflex overall. Better circulation means more efficient transport and binding dynamics of the released oxytocin.
3. **Electrolyte minerals like calcium and magnesium assist with neuromuscular coordination** critical in oxytocin neural pathways and myoepithelial contraction. These help transmission of signals.
4. **Antioxidants from plant extracts** combat effects of cortisol and inflammation post-calving that could inhibit lactation signals. Removing these interference pathways bolsters letdown response.

**By coordinating multiple biological systems, ingredients in the product work synergistically to promote efficient oxytocin release, circulation, receptor activation - optimizing milk ejection and letdown for fresh cow comfort and production.**

**Lameness**

**how Gut-Heal could help prevent lameness issues in fresh cows:**

**The stresses of calving and transitioning into peak milk production put substantial strain on cows' bodies that can manifest as hoof problems, sore muscles/joints, and injuries. Specific ingredients can help:**

1. **Calcareous algae provide bioavailable calcium and magnesium essential for bone density, cartilage synthesis, and muscle/nerve function**. Optimizing these mineral reserves enhances skeletal integrity and neuromuscular coordination to prevent strains/sprains.
2. **Antioxidants from extracts combat inflammation and damage from free radicals accumulated during calving/transition.** Reducing systemic inflammation helps protect tissue structures supporting healthy mobility.
3. **Compounds like gingerol and capsaicin improve blood flow to the extremities**. Better peripheral circulation delivers nutrients/minerals for hoof health and prevents ischemia that could cause sole bruising and ulcers.
4. **Saponins stimulate collagen production important for cartilage and flexor tendon repair if strains occur.** Chondroprotective effects reduce further joint deterioration to mitigate lameness long-term.
5. **Essential oil terpenes like thymol, carvacrol, and eugenol have natural antibacterial benefits**. This fights infection for any hoof cracks or injuries that could enter the blood stream leading to septic laminitis.

The combined effects help prevent structural/metabolic issues during transition stress that commonly manifest as lameness. Maximizing musculoskeletal nutrition and circulation protects cows' mobility and comfort.

**Overall**

**how Gut-Heal promotes overall health in transition cows:**

**The interplay between ingredients target the two key factors making fresh cows vulnerable - metabolic and immune dysfunction.**

1. **Optimizing Digestion & Metabolism:**

Enzymes, algae, essential oils, and buffers improve feed utilization by enhancing rumen fermentation efficiency and total tract digestibility. Cows extract more usable nutrients and energy from the same diet. This spares bodily reserves being tapped.

Higher VFA production (especially glucogenic propionate) stabilizes glucose synthesis and insulin sensitivity. This balances energy regulation so the cow isn't prone to dysregulation of fat/protein mobilization and hormonal cascades.

Maintaining mid-range rumen pH also prevents acute fluctuations that disturb microbial balance and fermentation outputs further destabilizing digestion and metabolism.

1. **Supporting Immune & Anti-Inflammatory Status:**

Ingredients like saponins, oligosaccharides, and polyphenols shift immune cell populations and cytokine signaling toward more regulated, anti-inflammatory responses.

Antioxidant activity counters excess free radical damage from calving/early lactation oxidative stress that depresses immunity.

**Natural antibacterials also help avoid pathogen invasion during the immunocompromised transition period. Preventing harmful bacteria translocation maintains immunometabolic health.**

**By coordinating nutritive and protective aspects, the combined effects sustain positive energy balance, homeostasis, and disease resistance - thus mitigating multifaceted issues fresh cows face.**