

# 1-GP

## MICROBIAL FEED ADDITIVE FOR POULTRY



Major technological breakthroughs in production agriculture are increasingly rare as we continue with major governmental regulations and rules regarding the introduction of new technologies into food production. This challenges us to take existing technologies and improve them by using educated and intuitive thought to make the production “engine” work more efficiently with more “torque” at a lower cost of input.

Life products has been in the microbial business for more than 40 years. Like your business, ours continues to change, but the base of our products and commitment is the same as when we began. We continue to bring new technologies using our knowledge and resources in the microbial arena.

1-GP is the latest in a series of products. 1-GP is a unique blend of 5 specifically selected beneficial bacteria fed to poultry at all stages of life. Beneficial bacteria are fed on a daily basis with the purpose of populating the lower gut. Bacteria are essential to all life and the specifically selected blend in 1-GP provides a diverse population which has several modes of action. Feeding 1-GP results in a healthier, more productive animal at a very minimal cost and adds dollars to your bottom line.

The bacteria found in 1-GP are from the “family” of lactic acid producing bacteria. They populate the lower gut (large intestine) to accomplish many purposes related to health and digestion.

**1** Competitive exclusion. Populating the gut with huge numbers of bacteria (bacteria fed to the animal then divide every 25 minutes in a logarithmic pattern) to exclude pathogenic bacteria (E.coli, salmonella, listeria, clostridia, etc...) from attaching to the lumen of the intestine, colonizing in the gut and potentially causing health and digestive problems.

**2** Research has shown that certain strains of bacteria can produce antibacterial agents such as hydrogen peroxide, lactic acid and other compounds that can kill pathogenic bacteria.

**3** Digestion. 3-10% of feed digestion occurs in the large intestine. Helping provide a better environment by reducing microbial imbalance in the lower gut allows for maximum digestion of feed-stuffs. It improves carbohydrate and protein digestion while increasing the absorption of nutrients used to grow and produce eggs.

**4** By providing a more stable lower gut flora, animals feel better and eat more. Greater consumption means a more productive and healthier animal. Optimizing performance and production enhances profitability.

**5** Research shows lower mortality and morbidity with 1-GP. This has a very significant impact on your bottom line. Sick animals require 2 X as much energy for maintenance as healthy animals costing you valuable time and money.

**6** Poultry fed 1-GP during development show a positive effect on days to first lay and duration of lay. This means more eggs throughout the life of the animal adding dollars to your bottom line.



A DIVISION OF:

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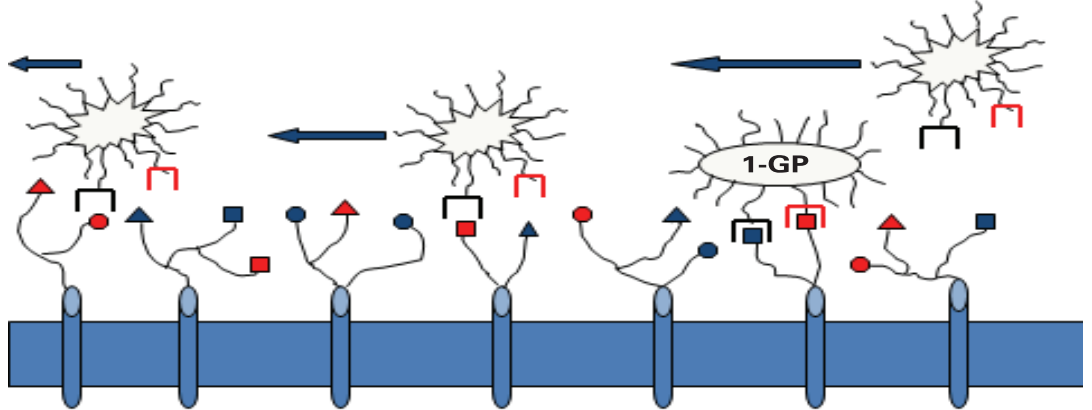
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### Competitive Exclusion

Feeding 1-GP daily at 2# per ton will supply approximately 1 million colony forming units of beneficial bacteria per gram of feed. 1-GP is a combination of specific selected Lactic Acid producing bacteria species that divide logarithmically every 25 minutes. The overwhelming number of beneficial bacteria takes attachment sites available in the lumen of the large intestine making the sites unavailable for undesirable bacteria to attach. In order for pathogenic bacteria to cause harm to an animal, they must find an available attachment site and colonize (divide and multiply) which would then produce toxins that can cause the body harm. Occupying as many sites as possible by chosen beneficial bacteria results in less activity by pathogenic bacteria species.

Beneficial bacteria physically out-compete bad bacteria for attachment sites as seen in the diagram. Lactic acid bacteria species also produce a variety of compounds that further make it more difficult for pathogenic species to colonize a particular attachment site.

**Luminal Side of Intestine with 1-GP Bacteria Attached and E-coli Bacterial Cells Continue to Flow thru the intestine within Digesta**



Research conducted in partnership with Life Products shows proof that this phenomenon is true. With animals in their normal environment, chicks fed the labeled rate of 1-GP, E-coli count numbers were essentially zero . . . when beneficial bacteria were withheld from the feed, fecal E-coli counts came back at very significant levels (10E8) in just a 1 week period as seen in this data set.

**Table 1. Effect of feeding 1-GP on fecal excretion of pathogenic E-coli (cfu/g).**

Sample number	Week 2 enumerations <sup>a</sup>	Week 4 enumerations <sup>b</sup>
1	< 100	2,000,000
2	< 100	9,000,000
3	< 100	140,000,000
4	< 100	30,000,000
5	< 100	1,000,000
6	< 100	100,000,000

<sup>a</sup> Week 2 was the middle of the three week period of feeding of 1-GP.

<sup>b</sup> Week 4 was one week after 1-GP was removed from the diet.

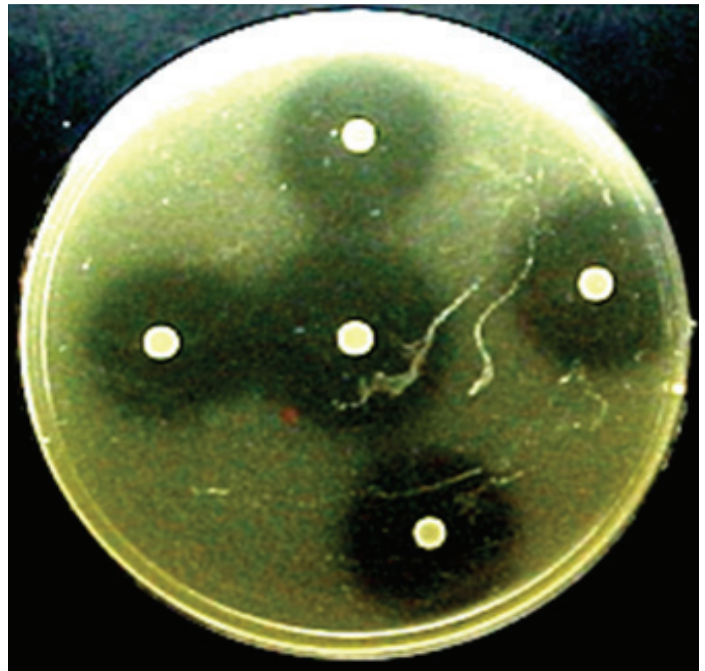
### Production of Antibacterial Agents

#### L. acidophilus Pathogen Inhibition

- Inhibition of *Escherichia coli* ATCC 25922

(5 colonies of LAB on plate competing with E-coli bacteria)

*\*note the five white colonies of LAB. The dark circles are clearing zones and the remaining cloudy portion is the growth of E-coli. The colony of LAB inhibit the growth of E-coli bacteria next to the colony.*



Lactobacilli and streptococci have been shown to produce metabolites capable of neutralizing E-coli enterotoxin. They also produce organic acids (lactic and others) that reduce gastric pH and the oxidation/reduction potential thus reducing E-coli overgrowth. These conditions also inhibit the growth of E-coli and other pathogenic bacteria.

LAB have been reported to change the bile of the intestine which also inhibits growth of pathogens. Lactic acid producing bacteria have also been shown to reduce the level of intestinal amines which can irritate the lining of the intestinal tract and cause diarrhea.

1-GP strains produce compounds that possess bactericidal activity. Lactobacilli produce hydrogen peroxide, which is bactericidal. Other compounds found to be produced by 1-GP bacteria are capable of inhibiting the growth of E-coli, and other related bacteria. Antimicrobial type substances in the forms of small peptides (Proteinaceous bacteriocins) are produced further inhibiting pathogenic microorganisms growth.

### Lower Gut Digestion and Absorption

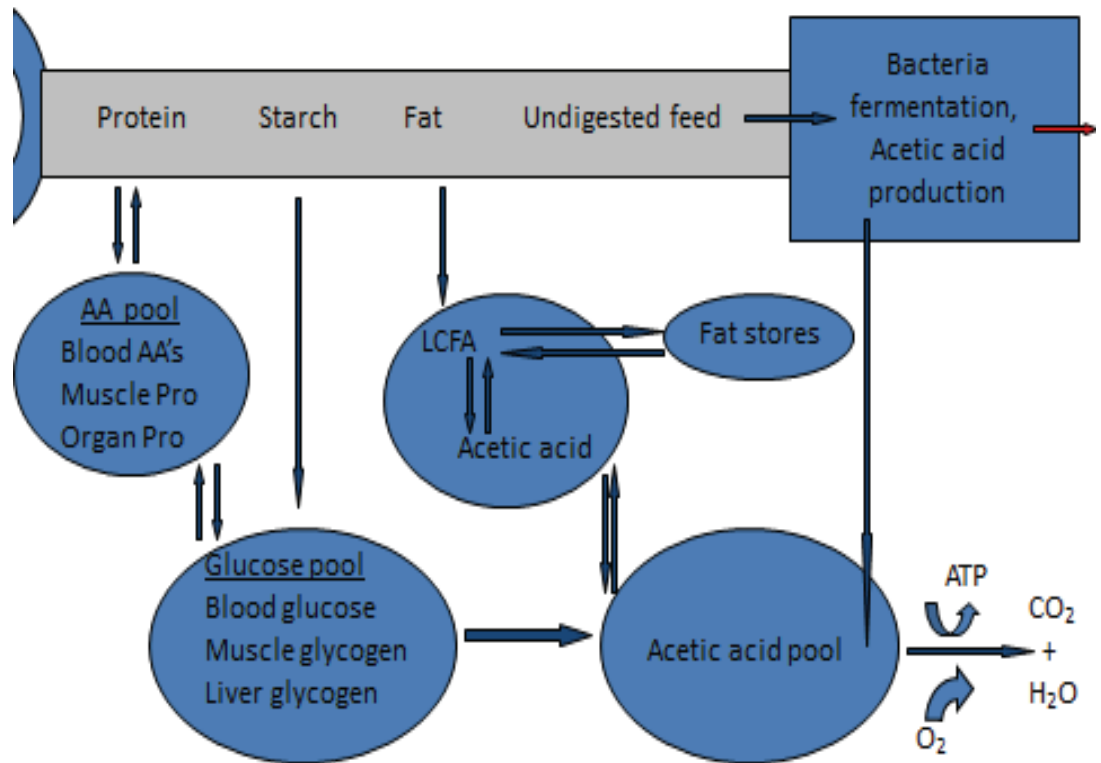
Lower gut (large intestine) digestion accounts for up to 10% of carbohydrate total tract digestion. Bacteria that digest in the large intestine are pH 6+. Fermentation does occur in this segment of the digestive tract, the amount of fermentation is dependent upon the passage rate of the digesta.





The level of activity, the importance of absorption and the ability to maintain the highest level of integrity possible in the digestive system makes a very powerful argument to utilize the technologies afforded by 1-GP. Assuring that the environment is favorable for the digestion and absorption of nutrients is critical for the improvement of efficiency and health.

### Intestinal Digestion and Absorption



Lactic acid bacteria (LAB) comprise a clade of Gram-positive, acid-tolerant, generally non-sporulating bacteria that contribute to the healthy micro-flora of mucosal surfaces.

The majority of fermentation occurs in the ceca of the chicken, indigenous microflora such as *Bifidobacterium* and *Lactobacillus* reside here. When fed fermentable substrates, these bacteria benefit from fermentation by-products such as volatile fatty acids. Research shows, fermentation was increased when alfalfa was provided as the feed substrate. Due to the longer retention time of alfalfa as a primary dietary component, fermentation is affected due to a longer exposure time when compared with cereal-based layer ration diets, which have a much shorter passage rate. Longer passage rates equal greater retention time, which should retard gut emptying and potentially serve as a barrier to pathogen colonization. Increases in lactic acid have been related to decreases in pH, thus inhibiting *Salmonella* crop colonization.

The action of fermentation and further digestion of feedstuffs is very important in feed utilization and feed efficiency. When we can get more from the feed we give an animal, we are more profitable.

Making sure that this environment is favorable for the digestion and absorption of nutrients is critical to improve efficiency in terms of feed conversion and gain.