

KPx Colostrum Technology

The Complete Story
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APPERON 

Colostrum is the first milk produced by cows and other mammalian mothers at or around the time of birth. Colostrum has been recognized for a long time as the essential 'first food'. In most species, failure to receive colostrum usually results in death of the newborn. Scientists first found that colostrum is full of antibodies, immune proteins produced by the mother's immune system. Antibodies are typically produced by B cells in the 'humoral' side of the immune response. They inhibit and target pathogens to which the individual, or, to some extent, the individual's ancestors, have been exposed.

This active immune system 'knowledge' from the mother is passed on to the newborn in colostrum. The intestinal tract of the newborn can efficiently absorb Colostral antibodies for about twenty-four hours after birth. With these facts, it was once assumed that colostrum would provide little immune system benefit to older animals.

However, colostrum researchers continued to uncover new compounds and effects. They found that antibodies are usually not species-specific. For instance, colostrum from cows (bovine) has been shown to successfully replace human colostrum for newborn babies. Although bovine colostrum does not give these newborns antibodies to certain human-specific pathogens, it appears to stimulate overall immune competence to a level equal to that of babies that are fed mother's colostrum.

In the past ten years, researchers have found that colostrum presents a much more complex picture than was first supposed. What has been called the 'first food' is actually a combination instruction manual and tune-up kit for the immune system. It contains a cornucopia of ingredients that stimulate and/or modulate specific areas of immune response. Each of these compounds has been shown to provide specific supports and/or controls for key immune activities. Some, such as lactoferrin, are active in several pathways at once, and provide multiple benefits. The emerging picture, supported by application in clinical studies and agricultural science, is that colostrum's array of bioactive agents can provide a wide range of immune, intestinal, and metabolic benefits for animals of any age.

Colostrum also contains proteins and peptides familiar to those who know GlutaSyn milk serum isolate. These include lactalbumin, serum albumin, and lactoferrin. The modern cow expresses an average nine gallons of colostrum in the thirty-six hours after giving birth. At this level of consumption, the newborn calf receives excellent GSH nutrition from these proteins and peptides. At supplemental levels, however, the delivery of these specific proteins and peptides will be much lower than is provided by recommended feedings of GlutaSyn.

Think of colostrum as providing information and input. Its strength is that it teaches, motivates, empowers and disciplines the immune system and other cellular and glandular responses. It can give a strong boost to overall immune competence and power and intestinal healing capacity, while also providing strong safeguards against immune system hyperactivity.

GlutaSyn, on the other hand, provides fundamental GSH-nutrition for all cells, including immune cells, which need it most. Used together, colostrum and GlutaSyn have obvious synergies.

Colostrum quickly prepares the GALT (Gut-Associated Lymphoid Tissue) of the newborn for the challenges it will face in the outside world. GALT makes up the lion's share of the body's immune system. It extends from lymph tissues in the back of the mouth down through the lower gut, in a system including the Peyer's patches and other sites throughout the digestive tract. The GALT responds in various ways to compounds and organisms passing through the intestines. This response has been shown to be partially sequential. For instance, when some colostrum components come into contact with the GALT tissues in the back of the throat, they stimulate GALT sensors lower in the GI tract to become more responsive to colostrum benefits. Therefore, it's important to feed colostrum in a way that ensures contact with the back of the throat.

You can carefully manage many aspects of an animal or bird's health and condition. With advanced nutrition, you can even ensure that certain key metabolites and building blocks are available for specific tissues. But every animal or bird soon learns about one area that is especially difficult to control or predict- the gut. Despite hard work and preparation, the fittest animal or bird can be sidelined overnight by transient intestinal upset. Less visible but much more common are the minor gut discomforts and sub-optimal gut conditions that diminish an animal or bird's overall well-being, nutrient absorption, stamina, and performance.

Aside from anatomical features that predispose an individual to some kinds of intestinal upset, what causes instability in intestinal tract? First of all, the gut is where a person receives the outside world and tries to turn it into nourishment. Most of what an animal or bird's takes in is beneficial- energy, nutrients, water-but some of it is not. Bacteria, viruses, molds, and other parasites also use the intestinal tract as their main invasion route. This makes the gut the major 'war zone' for the immune system. In fact, approximately 80% of the immune system is located in intestinal tissues, in the GALT (Gut-Associated Lymphoid Tissue), an archipelago of immune tissues that extends from the throat down through the colon. Many diseases not directly

related to gut health actually get their start when they successfully evade the front-line defenses of the gut.

Animals and birds depend on symbiotic partnerships with bacteria and yeasts to maintain gut health and squeeze energy and nutrients from food. This is a constantly changing relationship, as population ratios of the bacterial and yeast strains shift in response to changes in food, body temperature, acid-base balance, water intake, pathogens, exposure to stressors, and other factors.

How crucial are gut defenses and adaptability to survival and well-being? Consider how nature deals with the gut in an animal's very first crisis—the hours immediately following birth. Before producing true milk, the mother releases colostrum for the newborn to suckle. Colostrum is a potent cocktail of antibodies blended with an array of immunoactive compounds and nutrients. Colostrum seems to be designed to provide two major benefits—the transfer of immunity from the mother to newborn, and the rapid establishment of a healthy gut and strong gut defenses. Specifically, colostrum:

- 1) Transfers the mother's 'specific immune knowledge' to the newborn with antibodies the newborn can absorb into its system for the first 24 hours of life. These antibodies enable the newborn to recognize and mount immune response to many common pathogens.
- 2) Floods the newborn gut with substances that stimulate and program the GALT immune sites. This quickly enables the newborn's gut to begin fighting invading pathogens, and also helps reduce the likelihood of excessive and damaging inflammatory immune response.
- 3) Supplies growth factors that encourage the development of healthy intestinal tissue. These substances work fast to improve the status of the intestinal wall as an effective barrier to unwanted pathogens and toxins.
- 4) Supplies key nutrients, including selenium and vitamins A and D, in which newborns are deficient. Colostrum is also rich in lactalbumin, lactoferrin, serum albumin, and peptides known to increase production of the master antioxidant and 'lymphocyte support system', glutathione (GSH).
- 5) Delivers antibodies that, instead of being absorbed, attach themselves to the intestinal wall and assist the foal's own immune cells and antibodies in fighting gut pathogens.

With colostrum, nature seems to be saying, 'the way to a healthy person is through the gut.' But are these benefits available only to newborns? The research says, 'No'. Only the transfer of immunity (through absorption of whole antibodies) is restricted to newborns. The constellation of other

colostrum benefits, which emphasize the gut and its immune defenses, is proving to be available to animals of all ages.

Therefore, high quality colostrum can be an invaluable tool for conditioning animals and birds plagued by subtle gut dysfunctions. It is also an ideal immediate care option for animals and birds under more severe intestinal dysfunction. By providing the secrets of nature's own 'emergency gut conditioning program', colostrum can provide faster and more impressive benefits than any man-made formula could hope to supply.

KPx™ colostrum products are offered in liquid, powder, tablets and paste forms for different species, purposes, and methods of administration. They are made under exclusive arrangement in one of the most experienced and technically advanced processing facilities in the United States. This state-of-the-art operation assures consistent supply, quality and bioactivity, as well as the technology needed to develop future KPx technical advancements and innovation.

The production of KPx™ colostrum products starts with only the highest grades of colostrum, rigorously selected for maximum concentration and quality. Using advanced computerized processing systems and decades of expertise in formulation, manufacturing, and application, KPx™ colostrum products deliver reliable, proven performance in the real world.

In addition to expertise in colostrum processing, the team of scientists behind KPx™ colostrum draws on many strengths that give them a distinct advantage in testing and formulating the most effective colostrum products. Trained and experienced in bovine science and husbandry, veterinary science, animal and human nutrition, and biochemistry, the KPx™ research team is uniquely suited to develop effective solutions..

The colostrum used in making KPx™ products is collected from cows in the states of Minnesota, Wisconsin, and South Dakota. Bovine colostrum from this region is exceptionally high in immunoglobulins and nutrients, as compared to colostrum from cows living in more temperate climates. This is likely a response to the long, harsh winters in these northern states. Calves born in winter months immediately face bitter sub-zero temperatures and winds, and their mothers' colostrum meets the challenge with higher levels of immunoglobulins and other important immune- and growth-stimulating factors.

Colostrum products are only as good as the cows from which they originate. This is something KPx™ technology takes very seriously. KPx™ actively monitors its feeder facilities to ensure the best nutrition and facilities for its donor cows. Farms that provide KPx™ colostrum must

be open to unannounced inspections from KPx™ experts as well as other professionals. KPx™ provides donor farms with recommended feeding and medication guidelines as well as specific protocols that must be followed to maintain status as a certified KPx™ colostrum supplier. Full access to all treatment and production records is required and strictly enforced by KPx™.

To our knowledge, only KPx™ colostrum products are derived from cows monitored by a board certified animal nutritionist and fed nutritional supplements designed specifically to optimize colostrum quality and production. There is no better way to achieve optimum colostrum than by completely monitoring everything the cow eats and drinks each and every day of her life.

Today's genetically superior cows require technically superior nutrition. Scientific studies indicate that the composition of colostrum is affected by the nutrition a cow consumes. Pasture feeding without proper supplementation produces colostrum only as good as the first limiting nutrient in the pasture diet. In scientifically fed cows, this nutrient deficiency can be properly supplemented and corrected to ensure reliable production of consistently high quality colostrum.

By contrast, seasonal impacts on pasture quality directly affect the quantity and composition of colostrum of pasture-fed cows. With wide variations in pasture density, species composition, mycotoxin content, parasite load and nutritional content, pasture is a highly unreliable source diet for colostrum donor cows.

KPx™ professionals believe that the wide variations caused by pasture feeding should not be a part of colostrum supplementation. Consumers and veterinary professionals have a right to expect consistent and predictable results from the animal care products they use, and colostrum is no exception. This consistency can only be achieved through the scientific feeding approach demanded by KPx™ colostrum guidelines, which is consistent with proven modern methods for optimum herd management and milk production.

Unfortunately, many dairy farms selling colostrum to processors in the U.S. and abroad provide inadequate nutrition during the last stages of gestation and use sub optimal health care and environmental controls. This inevitably leads to colostrum of sub optimal quality. Often, the colostrum from these farms is treated as a by-product of the milking operation, and no specific nutritional inputs or management techniques are used to achieve a superior product. In fact, on many of these farms the best quality feed is reserved for the milking herd, because they are 'making money', and the colostrum donor cows in the 'dry lot' are short-changed. Because donor cows in these facilities are not monitored for colostrum parameters, metabolic and reproductive

disorders and prepartum dietary nutrient imbalances increase the likelihood of harvesting poor quality colostrum.

KPx™ Colostrum herd management is critical to the quality of the harvested bovine colostrum.

The following herd management practices are required of all KPx™ Colostrum source facilities:

- Herd on DHI and a monthly copy of DHI records to be kept in processing facility. Reason: Individual cows more easily monitored and managed.
- Adult cows in at least third or more lactation. Reason: Cows that have had three or more calves have had greater exposure to different disease conditions or have been repeatedly vaccinated. These cows tend to have higher values of specific proteins, antibodies and nonspecific proteins.
- Fully vaccinated cows. Reason: Any animal that is well immunized or otherwise protected from disease will outperform other animals. Annually vaccinate for IBR, BVD, PI, BRSV and Clostridia. Each six months vaccinate for Haemophilus and 5-7 strain Lepto. 3-4 weeks prior to due date vaccinate for Roto and Corona, Staph aureus, E-coli, mixed bacterin (Salmonella optional). As these are killed vaccines, sub unit, or otherwise engineered, best results are to vaccinate twice before calving.
- Dry cow treated Reason: Published data indicates that, with few exceptions, drug residues have cleared from the udder within the first month of the dry period.
- Using feed supplements specified by KPx™ scientists. Reason: Using these feed supplements prior to dry off, at dry off, before calving and at the time of calving improves the health of the cow. The period prior to calving is also an important time to give vitamin E and selenium for their recognized health benefits.
- Evaluate rations. Reason: This is extremely important in that the gestation period is an important time in preparation for birth and lactation.
- Clean udder and teats. Reason: This is important in evaluating the udder and the preparing for predipping.

The collection of KPx™ colostrum involves specific steps designed to maintain optimum quality and integrity of the product. Prior to parturition, cows are separated into specifically prepared calving pens maintained to provide a stressor-limited, comfortable birth. Following the delivery of the calf the cow's udder is cleaned and immediately milked of its colostrum. The newborn calf is given the colostrum it needs to thrive.

All the colostrum not required for the calf is transferred to colostrum-specific containers and quickly temperature-stabilized to guarantee the bioactivity of its ingredients. Strict guidelines for handling, storage and transportation are followed by all farms providing KPx™ source colostrum, assuring the colostrum arrives at the processing facility in the most desirable state. Each farm providing colostrum must prove that all procedures have been followed correctly

before any colostrum is accepted for processing. The collection staff assigns each unit of colostrum with identification that allows plant personnel to determine the source, collection time and date of each container. KPx raw colostrum can therefore be traced back to a specific farm, on a specific day, and in some cases the specific donor cow can be identified.

At the processing plant, the colostrum is subjected to numerous tests for IgG level, somatic cell count, bacteria levels, herbicides, pesticides and antibiotic residues. The table below details the many parameters evaluated during this screening process. This rigorous testing protocol ensures that all KPx Colostrum is free of synthetic hormones, pesticides and antibiotics:

Taste	Bland
SPC/gm	Neg.
Coliforms	Neg.
Yeast & Molds	Neg.
Salmonella	Neg.
Cloxacillin	Neg.
Cephapirin	Neg.
Cefalexin	Neg.
Nafcillin	Neg.
Cefadroxil	Neg.
Spiramycin	Neg.
Amoxicillin	Neg.
Cefalonium	Neg.
Novobiocin	Neg.
Ampicillin	Neg.
Sulfa-Compounds	Neg.
Naxcel	Neg.
Tetracycline	Neg.
Sulfapyridine	Neg.
Hetacillin	Neg.
Oxytetracycline	Neg.
Sulfasoxazole	Neg.
Virginiamycin	Neg.
Chlortetracycline	Neg.
Sulfamethazine	Neg.
Lincomycin	Neg.
Chloramphenicol	Neg.
Sulfadiazine	Neg.
Gentamycin	Neg.
Streptomycin	Neg.

Sulfathiazole	Neg.
Lincomycin	Neg.
Neomycin	Neg.
Sulfadimethoxine	Neg.
Erythromycin	Neg.
Neomycin	Neg.
Sulfamethizole	Neg.
Bacitracin	Neg.
Kanamycin	Neg.
Sulfanilamide	Neg.
Rifamycin	Neg.
Chlorpyrifos	Neg.
Methyl-parathion	Neg.
Malathion	Neg.
DDT	Neg.
Ethyl-parathion	Neg.
Parathion	Neg.
Diazinon	Neg.
Ronnel	Neg.
Phorate	Neg.
Dieldrin	Neg.
Ethion	Neg.
Fonofos	Neg.
Terbufos	Neg.

Once the source colostrum is certified for acceptance, macro impurities, such as mucus, blood cells and other particles, are removed from the raw colostrum. Microfiltration is an important part of this process.

Microfiltration (MF) uses membranes with a pore sizes greater than 1.0 micrometer. This type of filtration can be called dead end filtration, since all of the fluid passes through the membrane, and all of the particles that cannot fit through the pores of the membrane are stopped. This technique is used as a pre-filtration step to remove such things as bacteria, wild yeast cells, red blood cells, hair, cryptosporidium, pollen, and dust.

Next, the microfiltered colostrum is processed using minimal heat-less heat than when the colostrum is first produced in the cow-to ensure maximum bioactivity of all colostrum components while extending shelf life. One can easily call this low heat pasteurization, which

meets all international standards for achieving the desired purity required.

Ultrafiltration (UF) is then used to begin the painstaking process of separating various colostrum components. This separation process enables KPx™ scientists to recombine the colostrum in finished products of optimum concentration and bioactivity. UF is a time-consuming method using membranes to preferentially separate different fluids or ions. On the separation size spectrum, the UF pore size falls between MF (microfiltration-see above) and NF (nanofiltration-see below).

KPx™ technology uses UF to concentrate Colostrum Derived Proteins (CDP) that have a molecular weight greater than 10,000 Daltons. The separation is based primarily on the size of the species in the liquid relative to the size of the membrane pores, although the geometry of the pores, geometry of the species to be separated, electrical charge, and membrane surface chemistry may also play a part.

In ultrafiltration, small molecules such as water, monosaccharides, and all ionic species pass through the membrane while larger molecules, particulates, bacteria, and emulsified oils and fats are retained. Other components that can be filtered with UF are albumin proteins, endotoxins, virus, and carbon black.

Next, nanofiltration (NF) is used to concentrate specific bioactive colostrum proteins and peptides. The pore size used in NF is below approximately 0.01 micrometers. NF can separate smaller proteins that pass through MF and UF membranes. NF is precise enough to filter out endotoxins, small viruses, pesticides, herbicides, sugars, and salts.

Dried Colostrum and Ultra Specific Process Liquid Colostrum

The ability of KPx™ technology to isolate Colostrum-Derived Proteins (CDPs), and then re-blend them for enhancement of specific colostrum activities, is used to full advantage in the production of the KPx™ liquid product. KPx™ CDP isolation techniques give this high tech pure colostrum product outstanding effectiveness, without 'overdoing it' and destroying valuable nutrients and fragile protein fractions in the process.

By combining large pools of certified colostrum from many farms, KPx™ colostrum offers highly diverse antibody profiles. The pooled raw colostrum usually has a 6% antibody concentration. Liquid colostrum used to produce dried, powder colostrum is concentrated five-fold to achieve an initial 30% IgG concentration. After further processing and drying, a minimum of 25% IgG

antibody level remains in the dried product.

The IgG concentration of the liquid product, on the other hand, remains essentially the same as in its natural state fresh from the cow, at a minimum of 5% IgG. However, the liquid product is substantially enhanced by the addition of specific components and the concentration of specific bioactive proteins. This is referred to as Ultra Specific Processing (USP). For example, lactoferrin and various cytokines are concentrated to achieve significantly more efficient delivery of colostrum components than is possible with native colostrum.

What does a cow giving birth in the Great Plains of the Midwest have to do with an exotic animal or bird's health?

There is no better place to collect colostrum than from the excellent conditions found in the states of Minnesota, Wisconsin, and South Dakota, where the winters are long and harsh. Calves that are born in the winter months must survive bitter sub-zero temperatures, the coldest winds and the harshest barn conditions in their first days of life. The colostrum produced by their hardy, vigorous mothers must be the richest in immunoglobulins and other important immune and growth factors in order for their new born to survive.

KPx™ Colostrum is prepared using a proprietary process with minimal heat – less than when the colostrum is first produced by the cow – to ensure maximum bioactivity and bioavailability of all its nutritional components. KPx™ Colostrum contained in CDP, First Response, Fortifier Plus and Rapid Rehab is unaltered in content and is subjected to as few changes as possible in order to preserve its natural wholesomeness.

Scientific studies have clearly shown that colostrum and nutrients derived from colostrum help support the immune system.

When conventional medicines begin to fail, or antibiotic resistant pathogens pose a threat, we all need to rely more and more on our own body's ability to defend itself. Our first line of defense in this battle is the immune system. If we can supplement, naturally occurring antibodies and immunoglobulins, we can provide a direct mechanism to help regulate and support the natural immune system, maintain enteric health and help stay infection free.

What else does colostrum do?

Besides the obvious benefits of supporting the immune system, scientific studies have clearly shown that colostrum and nutrients derived from colostrum:

- Stimulate the normal growth, regeneration and repair of muscle, skin, collagen, bone cartilage and nerve tissue.
- Improve vitality and athletic performance
- Enhance the digestive system
- Build lean body mass

What are colostrums vital components that make its potential benefits possible?

Colostrums vital components are:

- Cytokines (Interleukin 1 & 6, Interferon Y and Lymphokines): shown to stimulate lymph glands and the immune system.* Important in the development of different cells associated with the immune system.
- Glycoproteins: these protease inhibitors are digestive factors which have been shown to help immune and growth factors survive the passage through the highly acidic digestive system.*
- Growth factors (IGF-1 and IGF-2; TGF-A and TGF-B): Medical studies on anti-aging/healing have shown the vital growth factors Insulin Growth Factors (IGF-1 & IGF-2) and Transforming Growth Factors (TGF-A & TGF-B), nucleotides from bovine colostrum to be identical to human in composition: Further, it has been shown that they can help stimulate normal growth, regeneration and accelerated repair of aged or injured muscle, skin collagen, bone, cartilage and nerve tissues.* These factors also help stimulate the body to burn fat for fuel instead of the body's own muscle tissues in times of fasting. IGF-1, a peptide that resembles the hormone insulin and other factors support the digestive system.*
- Immunoglobulins: Have been shown to provide a superior support for the immune system.*
- Interferon: A glycoprotein produced by cells that also support the immune system.*
- Interleukin-2: A cytokine that stimulates the growth of cells that make up the immune system.*

- Lactalbumins: Research indicates tremendous possibilities that lactalbumins can be highly effective in supporting the immune system.*
- Lactoferrin and Transferrin: Important in transport of essential iron to red blood cells.* these proteins act in the gut and bind iron, which impedes the growth of aerobic bacteria like E. coli. Combining lactoferrin with specific IgG produces more potent anti-bacterial effect to colostrums vital components.
- Lysozyme: A protein which is thought not to be digested but to persist in the gastrointestinal tract to support healthy bacteria.*
- Thymosin: Subunits act on the thymus gland and trigger the immune system.
- Oligosaccharides: A carbohydrate component that allows proliferation of healthy intestinal bacteria.*
- PRP (Proline-Rich Polypeptide); Shown to possibly support and regulate the thymus gland, it may help calm an overactive immune system.*
- Enzymes Xanthine Oxidase and Lactoperoxidase: Inhibit growth of pathogens in the gut

Under what conditions are the benefits of colostrum recommended for?

The nutrients and other vital components of colostrum are extremely beneficial to animals experiencing any of these challenging situations: malnutrition, stress, infection, injury, surgery recovery, problematic births, inaccessible colostrum from the mother, undifferentiated GI problems, the effects of corticosteroid administration, inflamed bowel disease and so on. Immunosuppression will cause a loss of both immunoglobulins synthesis and secretion at the intestinal level. The extent of this loss is going to vary according to the severity of the condition and the degree of immunosuppression.

In fact, any condition that requires the nutritional augmentation and immune support enhancement potential of the components of colostrum will result in positive steps in the achievement of beneficial results.

What else sets KPx™ Colostrum apart from others on the market?

KPx Colostrum is produced from healthy nutritionally supplemented cows raised in the United States on USDA and FDA Certified dairy farms. It is important to note that New Zealand

colostrum does not meet these criteria.

The cows supplying KPx Colostrum are scientifically fed the most advanced technology sound diets that contain the proper balance of forages, grains and minerals and vitamins to ensure consistently high potency colostrum. We believe this practice is far superior to pasture feeding that leaves nutrition to chance.

Much of the colostrum being sold today is processed from cows raised in sub tropical climates. Often times the heat stress and distressed feedstuffs provided to these cows decrease the quality of colostrum produced.

KPx uses only first milk colostrum collected within 12 hours of production. Most other colostrums on the market will use "colostrum" up to three days after parturition.

Many oral supplements and/or alternative colostrums commercially available are made from cheese whey, blood or genetically-engineered monoclonal antibodies. With the publics hysteria about mad cow disease, who would dare use a blood derived oral supplement?

In addition to being unadulterated to maintain its natural wholeness and nutrition, KPx™ Colostrum is free of synthetic hormones, pesticides and antibiotics.

Can you briefly explain colostrum as a dietary supplement on an every day basis for healthy animals?

- Other than immunoglobulins, gut absorption of proteins from colostrum continues into adult life and colostrum remains beneficial
 - o Immunoglobulins will continue to be effective against enteric infections.
 - o Lactoferrin and Transferrin continue to impede aerobic bacterial growth.
 - o Insulin-like growth promoting hormones are absorbed and enhance the uptake of glucose and amino acids.
 - o Thymosin subunits are absorbed and act on the thymus gland assisting in maintaining the quality of the immune system.
 - o Cytokines are absorbed and continue to stimulate various aspects of the immune response.

Has there been bioactivity testing done on the colostrum?

Yes. KPx™ colostrum is extensively tested for bioactivity, including immunoglobulin and bioactive protein levels.

KPx™ colostrum is independently tested by Dr. David J. Hurley, Professor of Microbiology and a member of the Infectious Disease Research Cluster of SDSU. KPx™ conducts additional testing on each unit of colostrum collected. Quality control of bioactivity starts with each cow's colostrum, not on a pooled batch as conducted by much of the colostrum from New Zealand. The KPx™ total nutrition program addresses the importance of nutritional inputs prior to parturition, to guarantee adequate inputs to enable the cow to produce quality output.

Because colostrum bioactivity varies with pasture quality, New Zealand Colostrum from pasture fed cows cannot guarantee a specific supply of bioactivity, and must rely on pooled colostrum to maintain basic levels. There are other relevant questions to ask about bioactivity testing. What tests are used to determine bioactivity? Are parameters other than initial immunoglobulin levels measured? New Zealand colostrum relies heavily on the use of the colostrometer, which, at temperatures lower than 20-25 degrees Centigrade will overestimate colostrum quality. At the farm the colostrometer can be used for a quick measurement, but it must be followed up at the manufacturing and processing facility with other methods, such as the RID technique. KPx™ is committed to using the most reliable testing procedures throughout its process to ensure optimum bioactivity in every bottle. At present, KPx™ is developing a proprietary in vitro test that will test colostrum bioactivity at the cellular level.

Has the colostrum been pasteurized and was it done by flash (161 degrees F for 15 seconds) or standard methods (145 degrees F for 30 minutes)?

KPx™ colostrum is flash pasteurized at low temperature, but that is just the beginning of a stable, bioactive product. KPx™ purification methods also employ filter pasteurization, which is significantly less destructive to bioactive ingredients and more complete in its "purifying" effect than the simple heat pasteurization employed by New Zealand colostrum. In fact, unlike most of New Zealand colostrum, KPx™ liquid colostrum is a sterile product. New Zealand's colostrum process does not remove undesirable substances to the extent achieved through KPx™ processing, because it uses only pasteurization, without the benefits of advanced filtration techniques. KPx™ filtration techniques can remove mycotoxins, which are unchanged

by New Zealand colostrum heating technique. Since pasture-fed cattle are subject to a host of naturally occurring toxins, including plant-derived and fungal chemicals that can pass through the milk, New Zealand colostrum should be treated with advanced filtration to insure purity.

Where is KPx™ Colostrum made?

KPx™ colostrum is 100% American colostrum, from KPx™-monitored herds whose immune competencies reflect lifelong exposure to the challenges facing animals living in the U.S., not those of a another, quite different, environment.

Is there any standardization of the colostrum?

KPx™ colostrum is highly standardized to meet strict criteria for purity, bioactivity, and immunoglobulin and bioactive protein content. In addition, donor cows are fed diets designed to give standardized, high quality consistent results from farm to farm, year after year. Achieving this level of consistent quality is scientifically impossible with pasture-fed cows. Optimum specific nutrient levels and other health care supports cannot be delivered using the pasture management applied to Symbiotics™ donor herds.

In addition, pasture feeding often results in improper sorting and management of cows for optimum health and production. The dry period for donor cows should be at least 8 weeks for optimum udder health and the production of quality colostrum (White, 1993). In fact, the process of colostrum immunoglobulin synthesis in the udder, and the transfer of these components across the blood-milk barrier to for colostrum formation, may begin as many as eight weeks before parturition. A short dry period has a very marked effect in depressing the immunoglobulin concentration in colostrum (Logan et al 1981, in Br. Vet J 137:279-282). The maintenance of proper dry cow periods is very difficult when cows are strictly pastured.

Is it frozen during any stage of the processing or is it refrigerated in its Original state?

KPx™ colostrum is frozen using procedures which have been shown to not reduce the bioactivity of colostrum in any way. Dr. D.G. White, MA, VetMB, PhD, MRCVS reported in a Compendium article (February, 1993) that colostrum can be frozen and stored at -18 C to -25 C for at least six months without affecting its bioactive properties. Roy, in The Management of Health in The Calf (1990, Vol 1. pp 17-53) states that frozen colostrum can be kept for 15 years without adversely affecting immunoglobulin concentration and bioactivity. Some KPx™ colostrum is frozen, while some is chilled and delivered immediately, depending on the date of collection and the distance involved.

It is important to note that the pH of naturally occurring colostrum is stable at about 4. However, if colostrum is stored unfrozen at this pH, total immunoglobulin concentration may drop as much as 50% after approximately 28 days (White, 1993). Either increasing the storage temperature to 20 C or doubling the concentration of acid will further hasten the decline in antibody titers. If unfrozen colostrum is routinely used without proper pH and storage temperature monitoring, significant decreases in immunoglobulin concentration can result (White, 1993). One-day exposure of colostrum at 30 degrees C will significantly reduce immunoglobulin concentration. Only rarely will colostrum stored in its natural liquid form be suitable for feeding to newborn calves and lambs (White, 1993).

Therefore the handling techniques employed at the farms supplying colostrum for KPx™ colostrum are scientifically controlled with modern methods and advanced measuring devices. Symbiotics™ uses non-frozen colostrum that is pooled from many areas, and, so far as we know, not tested for pH. These methods inevitably result in inconsistent storage temperatures and variable storage pH. We have no evidence that Symbiotics™ monitors pH in its gathered or stored colostrum, or, indeed, at any stage of processing.

Co-factors in colostrum also impact stability. Low dietary levels of selenium (an essential antioxidant) can significantly reduce selenium levels in colostrum. (Abdelrahman and Kincaid J Dairy Science 1995 Mar; 78(3):625-30) Selenium-deficient colostrum is significantly less stable and more prone to bioactivity losses in the liquid state. Pasture lands and pasture-fed cows (including many in New Zealand) are often selenium-deficient.

Is it agglomerated at ambient temperature to ensure the colostrum is totally dispersed in the bowel for full absorption?

Agglomerated powder can actually be heavier than non-agglomerated colostrum with the same starting particle size. Thus, agglomerated particles can sink in solution faster when mixed in water. Some agglomeration processes actually decrease solubility if not used properly. Colostrum components are extremely dispersible in their natural state as expressed by the cow. Dispersion is further affected by the number of particles per gram, surface area, electrical charge and bioactivity and reactivity of other colostrum components.

Are the cattle totally pasture fed or line fed?

All cows selected as donors for KPx™ colostrum are fed highly nutritious diets developed exclusively for optimum colostrum quality. Some of these cows are also grazed on managed

pasture. Agricultural scientists have long known that controlled feeding of scientific diets is far superior to the many uncertainties of pasture feeding, as measured by overall herd health, herd milk and colostrum production, exposure to environmental contaminants, etc. To assert instead a supposed superiority for pasture feeding is to ignore decades of agricultural and dairy management research, and is therefore unscientific and misleading.

Mammary gland health of dairy cattle is directly related to the supplementation of Vitamin E (Weiss et al 1997, J Dairy Sci Aug;80(8):1728-37. Better mammary tissue health leads to better quality colostrum of greater consistency.

Pasture-fed donor cows produce colostrum of variable quality (White, 1993). Collection of colostrum from pasture-fed cows occurs at varying intervals post-calving, and the collected colostrum is often stored on the farm under variable conditions for varying lengths of time (white,1993). Taken together, these variables can have a major impact on overall colostrum quality, consistency, and bioactivity. KPx™ technology minimizes these variables with a stringent, all-inclusive monitoring program, starting with the optimum care of each individual cow.

Is there any possibility of hormones or antibiotics (tested by a certified laboratory for the presence of pesticides, heavy metals, antibiotics and disease-causing pathogens being in the colostrum?)

No, KPx™ colostrum is extensively screened using state-of-the-art technologies to ensure zero levels of dozens of pathogens, toxins, antibiotics, and other contaminants.

Does the company that produce the colostrum have Government approved Safety Program?

Yes, the facilities used to produce KPx™ colostrum are regularly inspected by FDA and USDA.

Is the colostrum 100% colostrum, devoid of colostrum whey (whey is a byproduct of milk and colostrum, and is processed using heat and hydrochloric acid, two factors you definitely do not want associated with your colostrum supplement), milk whey, lactose, or fillers?

The PDR for nutritional supplements states that bovine colostrum contains casein, lactoferrin, alpha-lactalbumin, beta-lactoglobulin, and other components. Thus, even the PDR recognizes the important whey proteins that are an integral component of colostrum. The PDR states that bovine colostrum prepared by microfiltration is mainly composed of whey proteins and their associated immunoglobulins and the growth factors IGF-1, IGF-2, TGF-beta and EGF.

KPx™ colostrum is derived only from pure colostrum, and includes absolutely no whey or other components from the milk industry. With its intensive management of donor cows, extensive prescreening of each cow's colostrum at intake, and state-of-the-art filtration procedures, KPx™ is able to concentrate colostrum immunoglobulins and other bioactive proteins into a useful, extremely clean and consistent product.

Furthermore, this process can be continually adjusted to compensate for any transient inconsistencies in the source material. This advanced vertical colostrum harvesting system allows for active scientific quality control from start to finish yielding distinct advantages when compared to New Zealand colostrum's method of drying an inconsistent source material without standardization of content.

It's interesting to note that Symbiotics™ (a US distributor and marketer of New Zealand colostrum) state that they collect colostrum from the first 24-48 hours. KPx™ colostrum is routinely collected within 12 hours of birth. Stott et al. (1981 J.Dairy Sci 64:459) have shown that the first milking after parturition has higher immunoglobulin concentration than subsequent milkings. Other researchers and KPx's own testing have subsequently shown that the best colostrum for processing is never collected after the first 24 hours. In fact, Porter (1972, in Immunology, 23:255-238) clearly demonstrates that the concentration of immunoglobulins in colostrum falls exponentially at each milking. Therefore, we can only conclude that Symbiotics™ starts with an inferior product, even before it is processed.