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Disease control on organic and natural cattle operations

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Abstract

The number of cattle operations which manage their livestock as certified organic or as natural is constantly increasing. Common conditions that practitioners often see have bacterial, viral or parasite etiologies. With restrictions on treatments allowed, either by the United States Department of Agriculture (USDA) Certified Organic program or by other niche programs, it would help practitioners to know what is allowable to use and how to approach cases in these settings. This presentation aims to provide veterinarians with an awareness of animal health care when working with organic/natural producers and alternative therapies that are understandable to medically trained professionals.

Keywords: biologics, botanicals, phytotherapy, vaccine, organic cattle, infectious disease

Introduction

The Organic Food Production Act was passed in 1990 and its regulations were first implemented in 2002. The law and regulations set out a method of food production. It should be noted that the United States Department of Agriculture (USDA) considers the end product of organic production to be no different than from conventional methods of production in terms of quality and safety. It is only the method of production which differs. The term 'natural' is not defined by law and is therefore difficult to understand in detail. One person's idea of natural may not be the same as another's. However, it is the author's experience that natural cattle operations tend to not use any antibiotics or hormones (much like certified organic operations) but may use synthetic fertilizers and sprays. Therefore, for the purpose of this paper in terms of bovine respiratory disease, both types of systems will be treated as the same.

In terms of animal health and disease, prevention is codified in the organic sector, which is appropriate since antibiotics are prohibited. If an antibiotic is used, the animal must be permanently removed from organic production as required by the following USDA regulatory statement: 'The producer of an organic livestock operation must not withhold medical treatment from a sick animal in an effort to preserve its organic status. All appropriate medications must be used to restore an animal to health when methods acceptable to organic production fail. Livestock treated with a prohibited substance must be clearly identified and shall not be sold, labeled, or represented as organically produced. 7 CFR 205.238 (c)(7).'

In general, any 'natural' products are allowed. All synthetic products are prohibited, unless specifically petitioned to the National Organic Standards Board and recommended to the Secretary, who then makes further review and issues final approval or denial. In 2002, the USDA National List 7CFR205.603 (original, 10/2002) identified the following substances: 'alcohols (ethanol, isopropyl alcohol), aspirin, chlorine materials, calcium hypochlorite, chlorine dioxide, sodium hypochlorite, chlorhexidine (alt. dip & vet. surgical use), electrolytes, glucose/dextrose, glycerin, hydrogen peroxide, magnesium sulphate, oxytocin (only in parturient emergencies), parasiticides (ivermectin only, not routine/only emergencies; not in slaughter stock), phosphoric acid, biologics, iodine, lidocaine, hydrated lime (externally only), mineral oil (topical and as a lubricant; not as a dust suppressant), copper sulfate, FDA approved trace minerals and vitamins (7 CFR205.603, implemented 10/2002)'. In 2007, the list

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was amended to include 'butorphanol, xylazine – emergency use only, tolazoline – emergency use only, flunixin – as labeled, furosemide – as labeled, magnesium hydroxide, poloxalene – for emergency use only'.

Organic farmers use many different methods of treatment, from home remedies passed down through generations to very questionable methods. Such methods are usually not well known or accepted by frontline practitioners. For example, homeopathy is commonly used on organic farms. Due to the strict prohibitions, the author (a practitioner) has developed treatments for infectious etiologies that are based on scientifically tenable modalities, i.e. biologics and botanicals. The reason that biologics and botanicals have been chosen for the best possible clinical use is that substances derived from these sources generally stimulate, modify or otherwise augment the immune system. Organic farmers' awareness and faith in the healing powers of the immune system, no matter how little they may know of its biology, is also a good reason to use these modalities. It is the opinion of this practitioner that it is usually a good thing to try to bridge the world of veterinary science with life at the front lines in a way that is understandable to the client, as the client is the one who initiated the call for veterinary care of his/her animals.

Biologics

Biologics are those compounds that are derived from living organisms (bacteria, fungi, viruses and animals) and which usually modulate the immune system. The most commonly used biologics are vaccines to stimulate active immunity. The earliest vaccines (developed in the late 1800s) are still in use today, though modified, i.e. rabies, anthrax and black leg. However, prior to the antibiotic era, therapeutic biologics that confer passive immunity were relied upon to combat infectious disease. These are the serum products (e.g. BoviSera®, Colorado Serum Company; PolySerum® Novartis), which many veal growers still use. These are USDA licensed biologics that provide a source of antibodies to reduce symptoms and severity of disease due to *Pasteurella multocida*, *Mannheimia hemolytica*, *Salmonella typhimurium* and *Escherichia coli*. These are bovine-derived antibodies, but unfortunately the solution is obviously hemolyzed, which limits the ways to administer them.

Another type of passive antibody is hyperimmune plasma, a very pure product that can be administered intravenously for rapid tissue diffusion. There are commercially available human-derived products for medical use (mainly for rare blood disorders) and equine products for *Rhodococcus equi* marketed in the UK, Australia and the USA. Additionally, there is a botulism antitoxin available from the University of Pennsylvania, School of Veterinary Medicine for use in equine and bovine patients. The author uses a hyperimmune plasma product from cattle within his practice for cases of colibacillosis, salmonellosis and pasteurellosis. Farmers also use other biologics such as colostrum-whey products (Impro®) and bacterial cell wall fractionates of *Mycobacterium phlei* (Immunoboost®, Bioniche Animal Health).

Botanicals

Medicinal substances derived from plants and used as phytotherapy have been used by mankind since the beginning of time. Many well-known pharmaceutical companies got their start with plant-derived medicines. However, advances in organic chemistry in the early 1900s provided synthetic versions of the active constituents found in the botanicals, which often arrived after a long journey by boat and being potentially damaged for medicinal use. Once synthetics were mass produced by the pharmaceutical companies, plant-derived medicines took a back seat to pharmaceutically prepared synthetics. Yet this does not mean botanicals are not effective as they obviously have pharmacologic effects. Fortunately for medical professionals interested in phytotherapy, standardization via the United States Pharmacopeia (USP) and National Formulary (NF) guarantees that the active constituent found in a botanical medicine remains at uniform concentration from lot to lot. For instance, Zostrix® arthritis pain relief topical analgesic cream always contains 0.075% capsaicin, regardless of the country in which the cayenne peppers were grown, on what side of the hill they were cultivated or at what time of the year they were harvested.

Most of the medicinally active constituents are secondary metabolites such as alkaloids, glucosides, fixed oils, volatile/essential oils, oleo-resins, steroidal compounds, balsams, terpenoids and saponins. They can be given as dry herb, infusions/decoctions, syrups, glycerites, extracts, tinctures and fluid extracts. The term 'rational phytoherapy' has come into use over the last two decades, especially among European clinicians. Rational phytotherapy is a scientific, evidence-based system that encourages *in vitro* and *in vivo* studies as well as explains mechanisms of action, pathophysiology, pharmacokinetics and bioavailability. A quick search of PubMed shows there is an increasing amount of research on medicinal botanicals, both *in vitro* and *in vivo*, in humans as well as in animal species.

Approaching cases

Keeping in mind that the goal is to activate the immune system to effectively deal with infectious disease challenge, practitioners working with organic and natural types of livestock production need to consider a variety of approaches since reliance on a precision antibiotic treatment will not be the first choice due to various

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prohibitions. In conventional settings where antibiotics are readily available, it is customary to discuss which one will be used after a quick examination, dependent on the needs of the producer (usually cost versus withholding times). With organic or natural producers, a hands-on examination is very important, even if the examination is short. This is because actual symptomology is probably more important than arriving at a name for the disease. For instance, if a cow is suspected of having pneumonia, what are the sounds heard on auscultation? Hearing raspy or 'harsh' sounds is quite different from hearing wet abscesses or, worse, consolidation. Also, hearing raspy/rough sounds dorsally with fairly clear lower lungs (perhaps a primary viral stage) is quite different than raspy/rough sounds in the lower fields (likely a secondary bacterial stage).

How long has the respiratory condition existed? As practitioners well know, farmers have the tendency to call after a couple days of trying to treat a condition on their own – which, especially in the case of pneumonias, can be detrimental to the outcome of the disease even if an antibiotic is used. Importantly, what is the animal's general constitution prior to the current challenge? For instance, internal parasitism is a critical underlying factor in taxing the immune system of weanlings through yearlings and allowing opportunistic conditions to develop. Trying alternative treatments for a respiratory condition will be nearly futile if there is significant internal parasitism. There will be those times when a few individual animals need to be treated with a parasiticide and antibiotic in order to restore the animal to health. But for animals not as affected or early in the disease pathology, natural treatments that stimulate the immune system can work well if proper management is instituted.

As with conventional situations, but perhaps more importantly for organic and natural situations, the animals' environment and housing must be discussed, addressed and changed if needed. For instance, calves that are in an enclosure with somewhat poor ventilation and/or damp bedding must be removed from that environment for alternative treatments to have any chance of beneficial effect. And sometimes, if the pneumonia is caught early enough, simply placing the animals outside in fresh air with proper shelter and dry bedding will alleviate the situation. Removing dusty types of feeds (hay or grain) and using only the best feed will go a long way if the animals are still eating. Critical in feeding is that the diet is composed of high amounts of forage so that the immunosuppressive effects of rumen acidosis do not factor in as well. Simply put, the environment, diet and the individual animal presentations need to be considered prior to any treatments. This may sound basic, but as a practitioner the author knows that antibiotics will often work even when not changing the animals' environment whereas focusing on the entire system is required for organic and natural situations.

Treatments

Vaccines

Taking a look at various angles of treatment for an individual animal is just as important as looking at the general living situation as described above. Whenever possible, vaccination against pneumonic etiologies is important. However, realize that organic and natural farmers may balk at excessive vaccination programs. That said, in the author's experience, addressing pneumonia on organic and natural farms is best if it can be avoided in the first place. Biologics are the best way as they are known to enhance the immune system. Without doubt, using an intranasal vaccine consisting of IBR/PI_3 is critical when planning movement of cattle and mixing new animals together. If vaccinating with the intranasal vaccine is not possible a few days prior to shipping, then use Immunoboost® to temporarily stimulate the interferon-gamma. Its duration of effect is about 10–14 days. Repeat one time if needed.

Treatment protocol

Having been immersed in the organic dairy sector since veterinary school graduation 14 years ago, the author has had to develop non-antibiotic treatments for infectious disease. Taking into account the assessment of the animal and its overall surroundings, the actual treatment for an individual animal also takes a 'multi-pronged' approach. It should also be mentioned that the following protocol is used for any infectious disease that is systemic, whether it be respiratory, abdominal, uterine, or mammary. The protocol is based on 'aggressive' treatment based on biologics, botanicals and antioxidants given intravenously.

The approach for non-antibiotic treatment of infectious diseases is based on the following: (1) stimulation and/or modulation of the immune system via biologics, (2) antibacterial phytotherapy, (3) antioxidants, (4) fluid therapy for rehydration (it is critical to have proper circulatory function for the above therapies, or any therapy, to work best) and (5) use of antiseptics for lavage and irrigation as needed. The treatment for infectious disease problems is as follows: (1) Hyper-Immune Plasma – IV (adult cow: 250 ml; calf: 100 ml; SQ: follow-up if needed next day), (2) Immunoboost® – IV: 1 ml/200 lb (can be added to hyperimmune plasma), (3) Vitamin C IV: 250–500 ml; or IM 5 ml/100 lb s.i.d.×3 days (<30 ml/site), (4) herbal antibacterial tincture IV: adult cow: 90 ml combination of garlic, ginseng, goldenseal, wild indigo and barberry added to 500 ml bottle of dextrose, (5) herbal antibacterial tincture or powder for follow up as PO: 20 ml tincture b.i.d.×4 days or 2 capsules b.i.d.×4 days – garlic, ginseng root, barberry root and oregon grape root.

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It will be seen that treating an infectious disease without antibiotics is definitely more labor intensive. Note that flunixin, while allowed for organic livestock (double the withholdings), is not necessarily part of the protocol. The author assesses each case individually prior to considering flunixin usage, as fever is not necessarily detrimental (unless the animal is pregnant).

Conclusion

The above protocol has reduced symptoms and severity of systemic infectious disease in cases where (1) the farmer has called for veterinary assistance early in the disease, (2) management changes were immediately implemented, (3) labor was effectively provided for treatment follow-up and (4) prior to irreversible changes (especially in the case of respiratory disease). Admittedly, treating individual adult dairy cows is relatively easy due to the proximity of handling facilities. This is not the case for beef animals out on range. However, for incoming feedlot animals, using timely vaccines prior to arrival as well as an immune stimulant at arrival will likely achieve beneficial results. To summarize, working with organic and natural livestock producers is not rocket science but more in the realm of back to basics. If fundamental rules of biology are not broken and the immune system is allowed to function at its optimal level, there will be less need to reach for an antibiotic when called out to organic and natural livestock facilities.

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