

Meat safety through a process control approach to antibiotic residues

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Antibiotics are often used on farms to promote growth, to prophylactically prevent illness and to restrict spread of illness when animals are in close confinement. Many farmers identify the use of antibiotics as a key factor in helping to keep meat production costs low while producing high quality product. Yet studies linking improper use and overuse of antibiotics to antibiotic resistance highlight a growing concern.

As a result, some countries have banned the use of antibiotics in animal production while others adhere to specific Maximum Residue Limits (MRLs), safe levels or tolerances for specific antibiotics or antibiotic families.

Whatever the rules of your particular country or market, avoidance of violative levels of antibiotic residues is a key element in quality meat production.

The best way to ensure that meat complies with relevant antibiotic limits is to employ a process control system throughout all stages of the supply chain. A process control system is a critical element of Good Manufacturing Practices which, in the case of meat, is meant to ensure that the end product is safe, high quality, and complies with relevant standards.

Control starts at farm level

A process control system for antibiotic residue avoidance should address the key places where antibiotics can be introduced and where they can be spread. The antibiotic control system, if it allows the beneficial use of antibiotics, will also identify the processes necessary to ensure withdrawal of residues after drug application. For example, some of the control areas can include:

- Adhering to recommended withdrawal times in verified clean environments.
- Storage and record keeping.
- Monitoring cleanliness of growth areas.
- Monitoring animals for illness and isolating or marking them.



Feed and watering systems are key control points to check for antibiotic residues.

- Monitoring antibiotic levels in feed and water.
- Screening end product for antibiotics as end process verification.

The process control system can also be expanded to include other areas that affect meat production, such as monitoring feed for mycotoxins which can adversely affect animal health and growth rates.

Applying controls

Farmers that introduce antibiotics through feed or water in the early growth stage, to help prevent illness, need to verify that the antibiotics are not being reintroduced unintentionally after the intended use is stopped.

For example, if farmers have been making their own medicated feed, they should check that the hopper is free from antibiotic residues before switching to non-medicated feed. If feed gets delivered to a farm, a process control could be to sample and test it to make sure that the new feed is really antibiotic free.

Audits of raw material suppliers are important to make sure that contamination is not introduced by poor control processes in the supplier's manufacture.

If antibiotics are administered in water, the water systems should be flushed when antibiotics are stopped. The water system should also be checked to make sure that it



has been effectively flushed of antibiotics as well.

Antibiotics may also be reintroduced unintentionally during the withdrawal times through bird droppings.

Where feasible, poultry farmers can employ a finishing pen strategy used for other types of livestock where animals are moved to clean (antibiotic free) pens once antibiotics are withheld.

While changing houses might not be feasible for all poultry owners, some might choose to employ other hygienic practices such as changing litter between flocks to avoid reintroducing antibiotics from prior flocks and putting down a fresh layer of litter during final harvest.

Process verification

End product testing is useful to check that process controls are working. End product tests, however, are not preventative and representative sampling of finished products would require that too many tests are run.

It is simply not economical for farmers to rely only on end product tests other than to confirm that the production process is under control.

Process verification needs to take place along all steps of the production cycle. Doing this also enables pro-active measures

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to be taken to remedy any problematic situations before they affect the finished product.

Easy and economical antibiotic detection tests are available that farmers and processors can run pre-slaughter. The tests can test serum or urine and check feed, water and environmental cleanliness.

Tests can help ensure that antibiotic use on farms will be in compliance with mandated levels in final end product. For example, the Charm KIS (Kidney Inhibition Swab) test is a simple swab test that can be run on water, feed extracts, poultry serum, and live animal urine samples.

The KIS test is currently used by US

Department of Agriculture (USDA) inspectors at slaughter facilities to screen large animal kidneys for sulphonamides and antibiotic drugs after slaughter under the National Residue Program.

The USDA is implementing the KIS test in phases starting with cattle, and will eventually implement it for all livestock, including poultry. Using the same test as is used for pre-slaughter process control makes sense; it has sensitivity to the drugs detected at harvest and it is applicable to the raw materials used on farm.

Other available tests for process verification include drug specific lateral flow tests that can be run on feed extracts or poultry blood pre-slaughter.



The KIS test being used on pork kidney at harvest.

One such example is the Charm ROSA test series. These Rapid One Step Assays are easy to perform and can detect antibiotics at the family and individual drug levels.

For end product confirmation, farmers can sample serum of one or more animals for testing or they could sacrifice an animal and do finished tissue testing before sending an entire flock to slaughter. End product testing can be done on a system such as the Charm II System. Charm II is a benchtop laboratory system often used by larger laboratories in industry, regulatory and academia.

Charm II detection capabilities can be adjusted to meet specific regulations of different importing/exporting countries.

The universal acceptance of all Charm tests in HACCP and process control systems ensures mutual recognition and harmonisation of testing programs, and assures that a safe and wholesome product reaches the consumer.

Summary

Many farmers still rely on antibiotics for their critical role in maintaining animal health and helping to produce a low cost, high quality meat supply. Implementing a process control system for avoidance of violative levels of antibiotic residues is an important element of quality meat production.

By defining the key checkpoints and verification processes, a process control system enables farmers to verify that their processes are working along the production cycle, helping to avoid undesired outcomes and ensuring that the end product is safe, high quality, and complies with relevant standards. ■

Up to 20 KIS tests can be run during a single incubation.

