

## Developing a Feed and Water Withdrawal Program for Turkeys

Greg Hansen, Poultry Intellimetrics, Inc.



### Introduction

When USDA-FSIS issued the Zero Tolerance policy for visible fecal material entering the chiller in 1996 (USDA 1996), many looked to feed withdrawal as the silver bullet to prevent fecal contamination in the plant. Conventional thinking was that adding more withdrawal time is all that was needed to reduce plant contamination, but those who have processed carry-over flocks understand this is definitely not the case. In addition, adding feed withdrawal time may impact the welfare of the birds, and should be taken into consideration as well. Insufficient feed

withdrawal time can result in some or all of the gastrointestinal tract being full of digestive contents, which can cause significant contamination challenges. The introduction of more automated evisceration, which is less forgiving than manual techniques, has brought renewed focus on feed withdrawal. This article compares manual and automated evisceration at the plant, and highlights the importance of withdrawing water after feed withdrawal.

### Manual vs Automated Processing

Up until the last several years, turkey evisceration has primarily been manual. For most plants, the process of taking out the vent of the carcass has mainly been done by hand using a sharp knife or a vent gun. This leads to a high risk of the intestines being cut or severed, and accidental contamination can be as much due to human or surgical error as it is due to insufficient feed withdrawal.

For many plants, turkeys are suspended through the evisceration process by their legs and head so their backs are horizontal, called 3-pointing (Figure 1). As the carcasses proceed through the process, the lower intestine and cloaca hang down and away, so any fecal material that may seep from the cloaca or from nicked intestines can fall to the floor without causing contamination inside the carcass or on the back skin or wings.

This is not the case with some automated evisceration where, like chickens, the carcass is suspended only by the legs and subsequently has a greater risk of contamination if the intestines are full of fecal or if the contents of the lower intestines are watery (Figure 2). This has highlighted the importance of having less digestive material in the GI tract and avoiding runny fecal contents.



**Figure 1:** 3-Point evisceration and vent hangs below carcass.



**Figure 2:** 2-Point evisceration and vent hangs over thigh and adjacent back of carcass.

## Feed Withdrawal

Feed withdrawal is generally measured from the time the feed pans are raised in the barn until the first birds are processed. Depending on the number of birds in the barn and the speed of processing in the plant, the actual time off feed for the last birds to be processed can be several hours longer than the first birds. This can be a significant consideration on the feed and water withdrawal times. Some animal welfare programs limit the total time off feed for all birds not just those first to process, which needs to be considered when determining the withdrawal times.

When turkeys have access to water, feed passes through the intestines relatively quickly. When water is present for at least two hours after feed is withdrawn, the intestines can be emptied in as little as 4-6 hours, (Savage, 1998). This has led some to recommend a total withdrawal time of only four hours (Duke, Basha, and Noll 1996). However, the rate of passage can change when the birds have no access to water during loading and when they are in the coops (Duke et al., 1969). Most withdrawal programs and research articles have an optimum withdrawal time of 10 hours ( $\pm 2$  hours) off feed. This includes time off feed in the barn with access to water, time without water, time to load, transport time, and lairage.

## When To Start

Feed withdrawal begins several hours before raising the feed lines. Start by turning off the augers from the feed bin for the hoppers to be emptied and for most of the feed in the pans to be eaten. This will minimize the amount of feed wasted and put less stress on the feed lines when they are raised. It is important to have some feed left in the pans when the lines are raised so all birds stop eating at the same time. Completely empty feed pans will lead to inconsistent feed withdrawal.

While 10 hours is the target feed withdrawal time, the starting time for removing feed will be influenced by the availability of the loading crew, truck drivers, time required to load the turkeys onto the trucks and transport them to the plant, and lairage/staging time.

- For farms that are a long distance from the processing plant, the majority of the time off feed will be on the truck, and feed withdrawal time in the barn can be as short as one hour with access to water.
- Most loading crews will try to finish loading the turkeys before daylight for easier handling and lower downgrading. They often will opt for an earlier start time, which therefore increases the withdrawal time. For larger load-outs this will often automatically push total feed withdrawal to at least 8 hours.
- The time feeders are raised in the barn can be adjusted by the time of year in order to prevent the birds from having their big meals at sunrise and just before sunset. Withdrawal programs for daylight loading will need to take into consideration turkeys will have a big meal at sunrise.

## Water Withdrawal

While most programs focus on the time turkeys are off feed, withdrawal of water is a very important factor often overlooked. Understanding water withdrawal is as important as feed in successful withdrawal programs, especially with automated evisceration. In some situations where the plant has had elevated fecal contamination issues, the reaction is to increase the feed withdrawal time, which results in more time birds are drinking water in the barn and can result in more severe contamination issues in the plant (Savage, 1998).

Once feed is removed in the barn, the turkeys will continue to drink water which will process feed out of the crops into the gizzard. If feed is not available, the turkeys may start to pick litter off the floor and will continue to drink until the water is removed or when the loading crew arrives. Research suggests that if the bird eats litter, it impedes normal intestinal function, which may leave fecal contents in the lower intestine for 8-10 hours (Savage, 1998). This can lead to runny intestinal contents, both in the large intestine and ceca, which can pose as much of a contamination risk in the plant as birds with full intestines (Figure 3).



**Figure 3:** Contamination seeping from vent at 3-pointing.

The drop off the hock cutter is a common location for contamination to occur on flocks with runny fecal contents. For manual evisceration, runny intestines can lead to fecal seeping out of the vent when the carcass is 3-pointed. With automated evisceration, the vent and lower intestine are looped over the thigh and rest against the back of the carcass. Excessive or runny fecal will seep out the vent and contaminate the back of the carcass.

To prevent runny intestinal contents, withdraw water 2-2.5 hours after feeders have been raised or just long enough for the birds empty their crops. This has been a key component for lowering plant contamination with automated evisceration. However, during hot weather, best judgement should be used for water withdrawal.

## How To Have More Successful Feed & Water Withdrawal

1. **Raise the feed lines before they are completely empty.** If the pans are left down too long and the birds clean them out completely, it is difficult to determine when the birds last had access to feed. There can be a wide variation from bird to bird when they stopped eating, which leads to very inconsistent results and difficulty in adjusting the feed and water withdrawal program. The fines left in the bottom of the pan may be less digestible than normal feed and change the fecal consistency. For best results in a feed withdrawal program all birds should stop eating at the same time which requires some feed left in the pans when lines are raised.
2. **Ensure there is no feed on the ground.** Once feeders are raised, birds will start looking for a meal elsewhere. Feed on the ground from broken lines, broken pans, or other spills can allow the birds to eat up until the time of loading. These birds will not have sufficient time to drink enough water to clear the feed from their crops. Their entire GI Tract may be full when they are processed.
3. **Do not increase lighting.** Turkeys are stimulated to eat with increased lighting. Maintain the same lighting schedule during the feed withdrawal period as before the feed lines were raised.
4. **Avoid allowing birds to be without feed then over-eat just before feed withdrawal.** Situations where turkeys are without feed can cause over-eating, which increases the time required to digest their last meal. This can be an important factor if there are multiple loads out of the same barn over several nights. When this occurs, try to segregate the birds that will be left in the barn and return feed and water as soon as loading is completed. This problem can also occur when the flock runs out of feed and then has feed delivered too close to feed withdrawal time.
5. **Notify the plant if the feeders were not raised on schedule.** Often the order of production or even loading can be adjusted to account for the withdrawal change. Early notice pays dividends in helping the plant prepare for possible line speed reduction or even adding labor if necessary.

## Negative Aspects of Excessive Withdrawal Periods

One of the major revelations from the focus on feed withdrawal after the zero tolerance policy was established in the late 1990's was that excessive time off feed was as bad, if not worse, for contamination in the plant as compared to insufficient feed withdrawal (Savage, 1998). Excessive time off feed can lead to:

- Over-consumption of water leading to very watery digestive contents, including runny cecal contents.
- Birds will begin to eat litter off the floor, which increases the bacterial load in the intestine.
- Cecas can become bloated and are more likely to rupture (Savage, 1998).
- The liver continues to produce bile, which is stored in the gall bladder. Excessive time off feed can enlarge the gall bladders making them more likely to rupture during automated evisceration or to be cut during opening. Bile stains are immediate and permanent and require affected areas to be trimmed.
- There is an economic loss due to the bird shrink.
- Crops are harder to pull on dehydrated birds and may result in more broken pieces left attached to the crop skin that need to be removed, often by trimming.
- Gizzards from dehydrated birds are often green and difficult to peel.
- Longer feed withdrawal can make the intestines weak. Ten hours is generally adequate to clear the GI tract without negative impacts of reduced intestine strength (Bilgili and Hess, 1997). Weak or broken intestines, especially during venting can be a major contributor to contamination in the plant.

## Evaluating Feed Withdrawal

Verification of the effectiveness of feed withdrawal is generally conducted by looking at the crops, gizzards, and lower intestines. Evaluating feed withdrawal only by the number of contaminated birds can be misleading due to variations in the plant from machine setting to employee error.



### Crops

**Feed present:** Insufficient time off feed with water access to process feed out of the crop (Figure 4). Do not confuse a full crop with a drop crop.

**Empty:** sufficient withdrawal time with access to water.

**Runny/Water Present:** Excessive time on water with no feed. Possible runny intestinal contents.

**Figure 4:** Crop full of feed indicating insufficient withdrawal time with water access.

### Gizzards

An ideal flock will have some turkeys just about to eat and some that just finished eating when the feed was removed. The result will be an even distribution of gizzards with a small amount of feed, empty, and a small amount of litter (Figure 5).

Gizzards packed with feed reflect insufficient withdrawal time or binge eating, and gizzards packed with litter or feathers reflect feed withdrawal was too long and turkeys were eating off the floor of the barn (Figure 6).

Gizzards normally have a yellow lining. With extended time off feed and a halt to digestion, bile will back up into the gall bladder and then into the gizzard staining the lining green (Figure 7). This may indicate withdrawal time was too long. Presence of feathers and litter can also indicate withdrawal was too long and turkeys were hungry and eating off the ground.





**Figure 5:** Ideal gizzard contents. Yellow with only small amounts of feed present.



**Figure 6:** Gizzard impacted with feed indicating insufficient withdrawal time.



**Figure 7:** Green lining of gizzard indicates bile backing up in the system and withdrawal time too long.

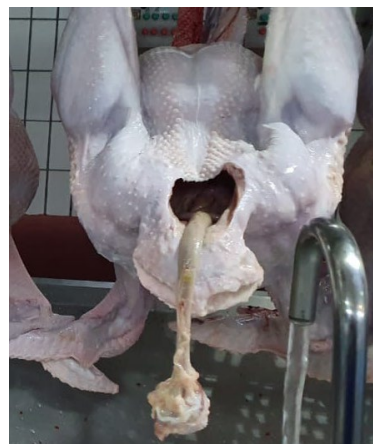
### Intestines

Managing the contents and texture of the lower intestines is the primary function of feed withdrawal.

**Empty:** Ideally the large intestine will be empty with minimal risk for contamination (Figure 8).

**Full:** Full large intestines pose a risk for contamination both from feces seeping out the vent or from nicking the intestine when the vent cut is made (Figure 9).

**Runny:** Watery contents of the large intestine pose a significant contamination risk, especially for automated evisceration (Figure 10). This can indicate excessive water consumption.



**Figure 8:** An empty large intestine is ideal for processing.



**Figure 9:** Full intestines pose a greater risk for contamination.



**Figure 10:** Intestines with liquid contents are a risk for contamination, especially for automated evisceration.

### Pendulous (Drop) Crops

How to handle turkeys with pendulous crops often arises in the conversation about preparing the flock for market. While the pendulous crop is not related to feed or water withdrawal prior to slaughter, these birds can pose a significant risk for contamination in the plant (Figures 11-12).

Part of the risk is due to the amount of feed in the pendulous crop which can sustain a bird for more than a day. Therefore, the intestines never fully empty prior to processing and lead to a higher risk for contamination. Removing the crops by hand in the plant is a physically demanding job, but an experienced employee will be able to remove the pendulous crop without breaking it or causing contamination. These carcasses may even qualify as Grade A. Many plants have added automated crop machines, but if the pendulous crop is not removed manually from the carcass ahead of time, the machine will puncture the crop making a large mess with a high risk of cross contaminating other carcasses.

From the farm and loading perspective, unless these birds have conditions that would prevent them from being fit for loading or transporting, they are generally shipped, as the pendulous crop alone does not make the carcass unwholesome.



**Figure 11:** Carcass with a drop crop poses a risk for contamination if the crop is ruptured in the process.



**Figure 12:** Contamination due to a drop crop.



**Figure 13:** Successfully pulled drop crop.

## Summary

Contamination from spilled intestinal contents is a major factor in how efficiently birds are processed in the plant. Elevated contamination can lead to reduced line speeds, increased labor costs, condemned product, and even regulatory action. Feed and water withdrawal is a key factor in reducing contents of the GI tract.

### Key points

- Ten hours of total time off feed from load to slaughter is usually sufficient to place the birds in a workable range for the plant to control contamination. Based on the time of slaughter, time of loading, and season, this time may have to be increased or decreased by two hours.
- Withdrawal of water is an important part of the withdrawal program with water withdrawal time 2-2.5 hours after feed lines have been raised, considering seasonality.
- The most effective feed withdrawal programs have some feed in the pans when the feed lines are raised to ensure all birds stopped eating at the same time.
- Extended feed withdrawal time allows more time for the birds to pass their last meal but can often result in runny intestinal contents, which pose a challenge especially for automated systems.
- Longer withdrawal time can result in weak intestines, swollen gall bladders and swollen cecas, which also pose contamination risks.
- While they can pose a contamination risk, birds with drop crops should be loaded.
- Like most aspects of turkey production, communication between the plant and the farms is key for feed withdrawal failures and successes.

## References:

1. Duke, G, M. Basha, S. Noll. 1997. Optimum Duration of Feed and Water Removal Prior to Processing in Order to Reduce the Potential for Fecal Contamination in Turkeys Poultry Sci. 76:516-522
2. Savage, Stanley. 1998. Feed Withdrawal A Practical Look at Its Effect on Intestine Emptying, Contamination, and Yield Pfizer Animal Health Bulletin
3. Bilgili, S.F. and J.B. Hess. 1997. Tensile Strength of Broiler Intestines as Influenced by Age and Feed Withdrawal. J. Appl. Poultry Res. 6:279-283
4. USDA Food Safety and Inspection Service. 1996. Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) systems; Final Rule. Fed Reg. 61:38806-38989
5. Nothcutt, J, and S. Savage. Managing Feed Withdrawal the Broiler's Last Meal. Broiler Industry September 1996
6. May, J.D. and B.D. Lott Managing Feed Withdrawal Poultry Digest Jan 1990
7. Thompson K.L. and T.J. Applegate. Optimizing Feed Withdrawal Programs Perdue University Bulletin AS576W
8. Wabeck, C.J. 1972. Feed and water withdrawal time relationship to processing yield and potential fecal contamination of broilers. Poultry Science 51:1119-11

*The contents of this Technical Bulletin are © Aviagen Turkeys, Inc and the advice contained herein is given as a guide and may need to be varied to meet a specific customer operation; in any event this advice should not be regarded as a form of guarantee.*

**Visit [www.aviagenturkeys.com](http://www.aviagenturkeys.com) for a complete library of technical publications.**

**Aviagen Turkeys Inc.**  
 200 Sonoma Lane, Lewisburg, WV 24901, USA  
 Tel: +1 304 793 2680  
 Email: [Turkeysinc@aviagen.com](mailto:Turkeysinc@aviagen.com)  
 Web: [www.aviagenturkeys.com](http://www.aviagenturkeys.com)



**Nicholas®**