

Achieving High Yields

Hatchery to processing

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Hatcheries are also an integral part of being successful in the processing plant. The two major factors are bacterial and mechanical. Good chick quality influences broiler performance and allows optimal performance from the start. If the chicks are compromised in any way, performance is simply reduced, showing up not only in poorer broiler performance but also in the plant. This includes bacterial problems (high early mortalities), with the effects lingering in the rest of the flock. As we add the normal stresses the birds face during their growing period, other issues appear (leg issues, FHN). Hatchery mechanical problems cause dehydration and navel issues. All of this prevents the chicks from getting the proper start needed to achieve optimal performance. This results in uniformity issues seen as early as the first week. Recommendations given below are part of an integrated, broad-based effort to improve yields.

Processing Plant Concern	Specific Effect on Meat Yield at Plant	Hatchery Recommendations to Improve Issue
Contamination	Carcasses are condemned for septox; increased downgrades	<p>Disinfectants Use approved products for hatchery challenges. Run sensitivity tests to insure you have the right product for your specific challenges.</p> <p>Tray washers Keep tray washers working properly with water temperatures no lower than 63°C (145°F). Remember that when the chick hatches, their navels are not closed. Clean trays are extremely important.</p> <p>Incubator and hatcher Remove the organic residue in incubators and hatchers. Disinfection will not work properly if the organic matter is still present. Hatcheries need to stay clean and disinfected at all times.</p> <p>Egg Quality Standards need to be implemented to insure good clean hatching eggs at all times.</p>

Processing Plant Concern	Specific Effect on Meat Yield at Plant	Hatchery Recommendations to Improve Issue
Uniformity and Yolk Sac Retention	Carcasses are damaged by automated equipment due to uneven sizes. Sales histogram is impacted with each poor flock	<p>Preventive maintenance in incubators and ventilation equipment Prevent improper cycling of the incubators. Keep chicks from overheating with hatcher step programs. Reduce temperature in the hatcher before the chicks get hot.</p> <p>Incubation times Pre-pull assessment should show 70-80 % of chicks out 12 hours before pull.</p> <p>Timing from pull to delivery Chicks should be delivered as soon as possible after hatch.</p> <p>Chick holding Holding conditions need careful attention so as not to overheat or cool chicks. Do not hold chicks in front of fans.</p> <p>Chick temperatures Rectal temperatures need to be targeted at 40°C (104°F) from the hatcher through the first 3 days of brooding.</p>



Maximizing yield must be supported by good chick quality coupled with sound management practices to produce healthy broilers. It is not possible to overcome poor management or sickness. The genetic potential for yield of any breed can be realized or reduced by the quality of the husbandry at the rearing farm.

Farm or Processing Plant Concern	Cause	Recommendations to Improve Issue
Carcass Quality - Bruises and Scratching	Improper stocking density	Use local legislation guidelines for housing type, environmental controls, feeding and watering space. Stay below 42Kg/m ² (8.6 lbs/ft ²). Reduce placement numbers, rear to a lighter weight or thin birds as the allowable weight/area reaches maximum. Avoid activities that cause birds to climb on top of each other: Abrupt farmer movement through the house; time clock feeding which causes birds to pile when the feeders/lights come on; allowing the birds to run out of feed or water. Make sure there is adequate feeding space and that the feeders are full when the lights come on.
Underweight Birds in Hot Weather	Inadequate temperature and/or ventilation control	The ventilation system must be able to remove the heat generated under and around the birds. Above 42Kg/m ² (8.6 lbs/ft ²), it is impossible for any ventilation system to adequately remove this heat. In open-sided houses, densities above 30Kg/m ² (6.15 lbs/ft ²) should be avoided.
Plant Condemns (Rejects)	Excessive bruising, disease, poor flock uniformity	Reduce lighting after brooding (5-7 days) to 5 lux (where regulations allow) to reduce hyperactivity during growing. Follow proper vaccinations needed for the particular location or area. Upgrade brooding procedures to maximize feed/water intake early.

Farm or Processing Plant Concern	Cause	Recommendations to Improve Issue
Pododermatitis, Breast Blisters, Infectious Process	Improper litter management, high stocking density	Keep litter below 30% moisture to eliminate caking. Use litter material that is medium to small particle size and has good absorption capacity. Maximize brooding management for a proper start to reduce skeletal (leg) concerns. Monitor bird health to eliminate wet droppings or excess water consumption.
Flock Unevenness	Poor brooding, chicken anemia, infectious bursal disease, runting and stunting syndrome (RSS)	Maximize brooding techniques for the best start. Perform a “chick check” during the first 24 hours by palpating the crop to record the percentage of chicks that have found feed and water. Follow proper vaccination programs and techniques. Increase down time to reduce pathogens carrying over from one flock to the next - at least 10 days. Follow proper bio-security procedures to keep diseases away from the flock. Clean out feed bins often to eliminate moldy or stale feed.
Carcass Contamination /Shrinkage	Improper feed/water withdrawal	Fast birds prior to processing by taking them off feed for 8 to 12 hours. Water should remain available up to catch time. Maximum time from feed removal to actual slaughter should never exceed 12 hours.
Flock Performs and Processes Poorly from Placement Forward	Broilers are placed in a house that is not ready to receive birds	Insist on a pre-placement protocol to verify that feed, water, litter and air are ready for chicks.

The yield, or amount of Kg (lb) of salable meat through the processing plant can be affected (reduced) considerably due to broken bones, scratches and bruises obtained prior to slaughter. Using caution during the time just prior to catch will reduce the downgrades and resulting loss of yield by delivering more birds into the plant free of any defects.

Farm or Processing Plant Concern	Cause	Recommendations to Improve Issue
Scratching, Bruising	Abrupt activity in the house setting up for catch	Reduce the hours of darkness in the days just prior to catch in order to get the birds acclimated to a higher level of activity. Feeder “on” time should be increased with the daylength increases. Work in the house slowly, avoiding piling and flightiness which may bruise or scratch the birds.
Shrinkage	Withdrawing feed and water for catch	Most weight loss happens in the first six hours after feed withdrawal. Little weight loss happens after eight hours of feed withdrawal. If, during catch, there will be more than 30 minutes between loads, then the lighting should be raised to normal intensity, doors closed and water lines lowered to allow the birds to move freely and rehydrate and then lifted just before the catching starts again.



New Scratch



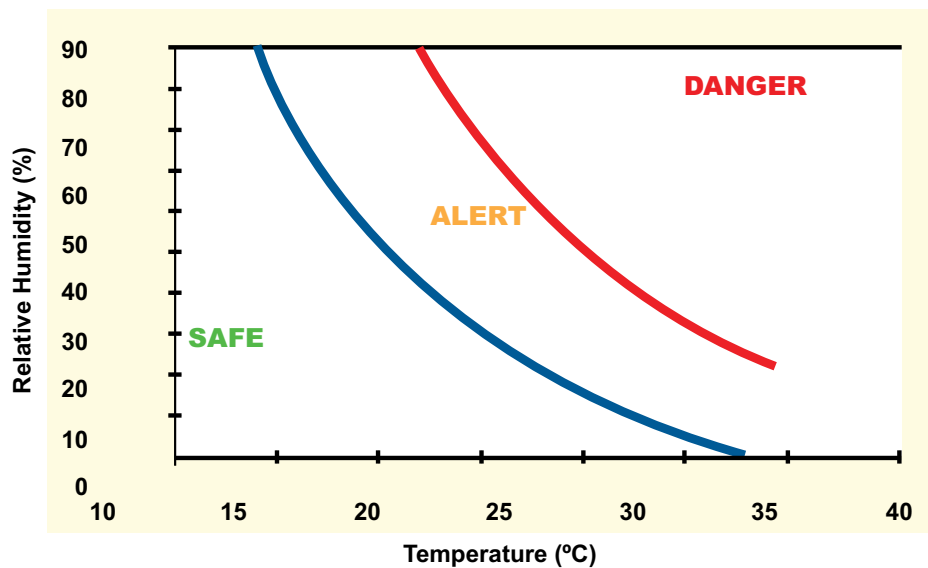
Old Scratch

Catching can be done manually or by machine, with the majority of companies worldwide using manual catching methods. Birds are not used to much external stimulation; therefore the introduction of the catching crew will be a stress on the birds, as seen in the blood plasma levels of corticosterone and lactate. Catching procedures designed and implemented to keep this stress to an absolute minimum will result in higher yields from less bruising, leg and wing damage, less thermal stress and/or smothering and reduced DOA.

Farm or Processing Plant Concern	Cause	Recommendations to Improve Issue
Bruise Rate of Up to 25%	Rough handling during catching	<p>Birds must not be carried by the neck or wings. Catching team must be trained and monitored to minimize the stress on the birds. Studies show that catching machines produce 4-8% less bruising than hand catching. Rubber fingers in machine catching can reduce leg bruises by up to 9%. Cages and equipment must be well maintained to avoid injuries (doors).</p> <p>It is not widely agreed on how many birds can be handled by the leg at one time or at what weight the birds need to be double leg handled. Two birds in each hand would be a model method, but it has also been written that six birds at one time can be safely caught. Follow local legislation if in doubt. It has been found that dropping birds from a height of over 40cm (16 inches) increases the chances of wing damage. Loading birds into a crate higher than 1.5 meters (5 ft) must be avoided.</p>
Thermal Stress and Overheating	Improper control of temperature during catch, transport, and holding	<p>Each driver should know and not exceed the stocking density of the vehicle. Transport times should be kept to a minimum. Use mobile stirring fans to reduce the effective temperature during catching. Mobile cooler trailers with evaporative cooling should be used in hot conditions during loading.</p>

Farm or Processing Plant Concern	Cause	Recommendations to Improve Issue
Suffocation	Crowding, high temperatures during catch	With daytime catching, holding partitions should be set up prior to catching to keep birds in smaller groups. Blue or green lighting during catch will reduce bird activity and piling. Train the catch crew to ensure that the birds are not overcrowded along the walls and fences.
DOA	Birds weakened by disease, injury, or overheating. Exceeding the density limits of the vehicle	Do not load or transport sick or injured birds. In extreme weather, they should be cooled in the summer either by water or fans and the trucks should be covered with winter sheets in cold weather. Do not exceed the proper number of birds or weight density for the type of cage used.

Guidelines for Loading Poultry (M. Mitchell, 2008)



Fan trailer for on-farm cooling when loading

Minimizing holding times and providing proper holding areas for live birds waiting to be slaughtered are necessary to reduce thermal stress and provide proper bird welfare. This is absolutely critical to reduce live shrink and DOA - the two factors normally used to measure performance in the holding area.

Problem	Cause	Recommendations to Improve Issue
Thermal Stress and Overheating	Improper control of temperature during and holding	Minimize holding times through good logistics and communication. A well designed shed has high speed fans located to blow through the coops or cages to remove heat as well as provide a wind chill cooling effect to the birds. These fans should be turned on anytime the temperature reaches 24°C (75°F). The shed will also need a water atomizer system for use when temperatures reach 27°C (80°F).
Loss of Yield Through Live Shrink	Excessive holding times	Holding times should be part of a comprehensive plan that considers feed and water withdrawal, catch and transport times as well as the plant operation schedule. A good program that maximizes results usually has a goal of holding times of 2 hours or less at the plant. In an operation with proper feed and water withdrawal, logistics and good holding conditions, the shrink loss should be less than 0.50%.
Poor Feather Removal and Discoloration of Meat	Extreme stress or temperature extremes while waiting for slaughter	Use holding sheds or shade with fans and misters in hot weather. Protect loads from extreme cold in winter. Use European-style lairage systems with darkened holding areas whenever possible to reduce stress.
DOA	Thermal stress, diseased or weak birds	40% of all DOAs are from thermal stress. This includes the time during transport as well as the holding period at the plant. This number should be 0.25% or less.



European type Lairage, utilizing blue light to keep the birds calm



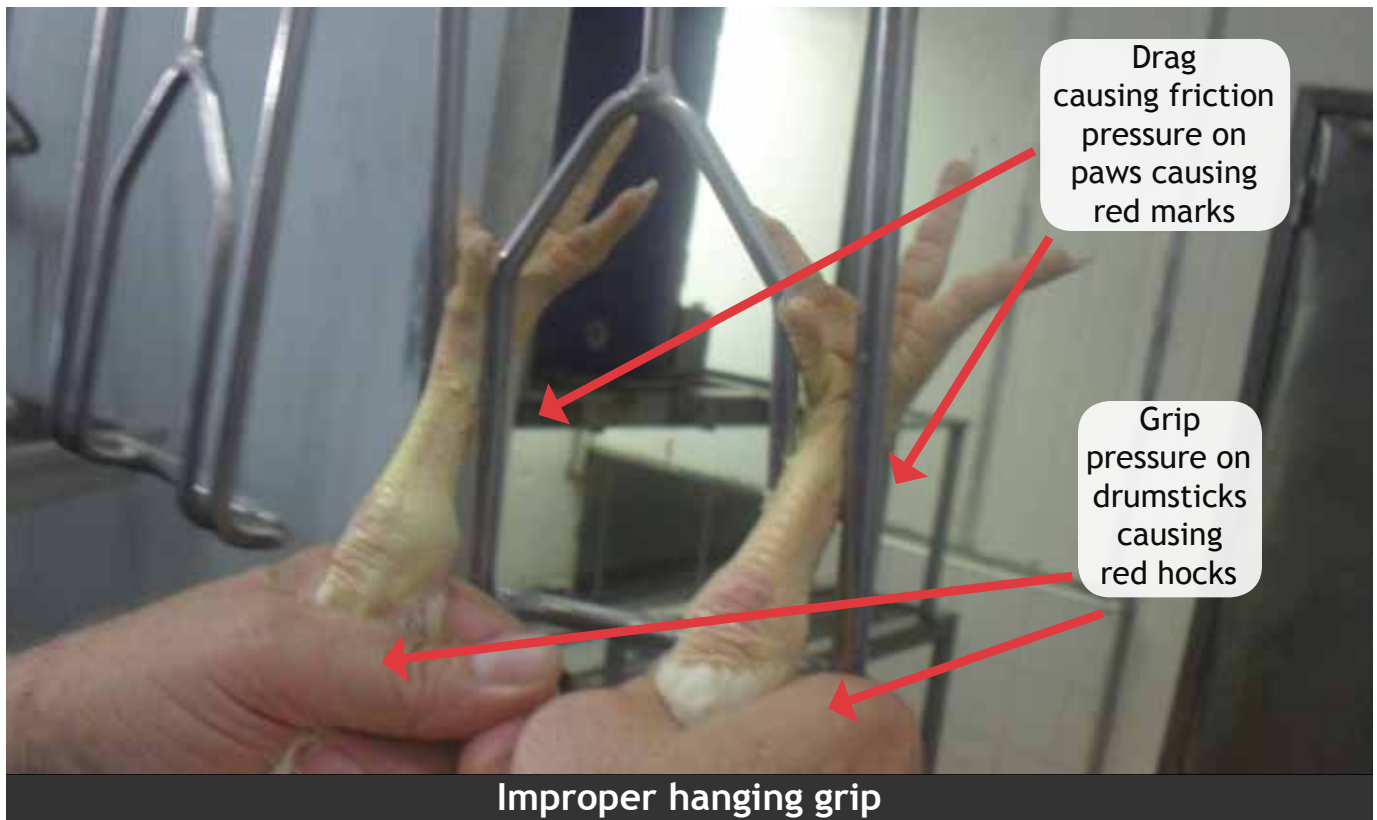
Shaded area with fans

The unloading and hanging operation sets the stage for the rest of the plant operations. Not only does it dictate the efficiency of the kill operation, but if not done properly will cause problems and yield loss throughout the operation.

Processing Plant Concern	Cause	Recommendations to Improve Issue
Bruising and Broken Wings	Bird damage caused from both coop/cage damage as well as strays being re-caught	Repair/replace damaged equipment. Institute a program to monitor and maintain on a consistent basis.
	Rough unloading of coops	Design the unloading system to promote ease of handling. Train workers to not throw or drop coops onto belt or chain.
	Dump system	Train dump operator on proper methods. Maintain dump equipment to avoid hang or catch points. Adjust belt speeds to minimize birds falling on each other.
	Hanging area	A proper hanging area has black or blue colored (not UV) lights and is a darkened area to keep the birds calm. Place shackle height at correct ergonomic level. Ensure proper shackle and loop gap. Set dump belt speed to have adequate birds to keep the lines full without causing pile-ups. Train hanging personnel in the proper method of handling birds. Install a breast rub to keep birds calm.



Breast rub



More stress on the bird requires more effort from the hangers.

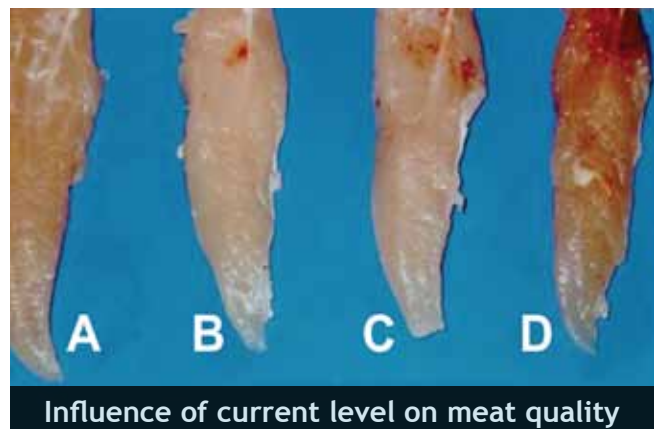


The kill and bleed step in some form is common to all operations. It is one of the biggest areas of product loss and downgrade in all plants if not done properly. Regardless of method, government or religious requirements, the aim is to slaughter the bird in a humane manner and remove the blood from the carcass. Doing this without damage or downgrade to the bird is a challenge.

Processing Plant Concern	Cause	Recommendations to Improve Issue
Broken Pulley Bones Shoulder Bone Damage Dislocated Wing Joints Hemorrhages Blood Spots in Breast Meat and Tenders Wing Discoloration	<p>Over-stun: Stunner voltage and milliamp per bird is set too high</p> <p>Inconsistent stun due to improper cabinet set-up or un-uniform bird sizes</p>	<p>Adjust volts and frequency to achieve the lowest possible current to position the birds properly for killing.</p> <p>Adjustments must meet regional and government regulations.</p> <p>Stunning must insure that birds remain unconscious until blood loss prevents recovery.</p> <p>Ensure that there is no pre-shock, no excessive water overflow, a good foot spray, the correct stunner height, and a good electrical ground set-up.</p> <p>Good genetics and good farm management can assure the best possible uniformity.</p>
Poor Bleed-Out Cadavers	<p>Too short of bleed time/ improper cut</p>	<p>Check for sharp blade. Set the blade and guide bar/ roller for desired bleed.</p> <p>Cutting one jugular and one carotid - 120 seconds.</p> <p>Cutting 2 jugulars and 2 carotids - 90 seconds.</p> <p>Some local regulations require three minutes - never bleed more than three minutes.</p> <p>Insure that the back-up killing personnel are properly trained.</p> <p>Do visual confirmation of bleed times at the entrance to the scalders.</p>

The other stunning option that is available is **Controlled Atmosphere Stunning (CAS)**. This includes both the chemical types that replace oxygen using CO₂ or other gases, and systems that remove the oxygen from the birds by mechanical means. These systems all do a non-recoverable stun.

Advantages	Disadvantages
Uniform stun of all birds. Better environment and ergonomic work area for live hangers. Birds are non-recoverable - better welfare for hanging and going into the scalders.	DOA identification is difficult. Automatic killing machine settings are more difficult as the wings are not tucked and neck extended. Expect an increase in wings cut by machines in these systems. More expensive to buy and operate.



The scalding and feather picking (feather plucking) area is the place which has by far the most potential for yield loss. This is truly an area where success or failure is measured by small increments and with exacting detail. Scalding is required to dilate the skin follicles to allow easy removal of the feathers, but a half degree of scald temperature can mean a huge loss or gain in yield. Heat destroys the underlying tissue and collagen. Not only is the weight lost, but also the ability to retain moisture. **Remember - HEAT IS THE ENEMY OF YIELD.**

Processing Plant Concern	Cause	Recommendations to Improve Issue
Overscald	<p>Scalder temperatures too high</p> <p>Too much dwell time in scalder</p>	<p>Excessive scald temperatures will result in both bird damage and yield loss. Optimum temperatures range from 51°C (124°F) to 55°C (132°F). Dwell time should be a maximum of 180 seconds, depending on product mix and pickers available.</p> <p>Agitation should be adequate to keep the birds from floating and assure that all feathers are completely wet.</p>
Broken Wings, Skin Tears, Mutilation and One-Leg Birds Coming Out of the Pickers	<p>Picker settings too aggressive.</p>	<p>Check to see that rotation and alignment of picking fingers is correct. Train picking personnel to properly adjust the pickers.</p>
Too Many Feathers Left on the Birds	<p>Pickers not set properly</p> <p>Bleed time too long causing feathers to be hard to remove</p> <p>Scald temperature too low or dwell time too short</p>	<p>Ensure proper scalder operation and that the bleed time is not too long.</p> <p>Dwell time should be a minimum of 90 seconds.</p> <p>100% of the feathers will not be removed by the equipment. If the scalder temperature is set too hot to ensure 100% feather removal, it will result in overscald of the breast. The pickers must be set for the largest birds. If set to medium or small birds, the largest birds will be damaged because the pickers are too tight.</p>



Overscald to the breast



Heat damage within the breast muscle

The goal of this area is to efficiently prepare the bird for chilling while maintaining quality, wholesomeness and yield.

Processing Plant Concern	Cause	Recommendations to Improve Issue
Contamination	Improper feed/water withdrawal	Optimum time from feeders raised to actual slaughter is 8 to 12 hours. Water should remain available to the birds as long as possible, and a minimum of 2 hours after feed withdrawal.
Yield and Efficiency Loss/Rework Labor	Improper machine adjustment or upkeep. Line stoppage or slowing down.	Train personnel on correct methods of operating and maintaining equipment.
Excessive Trim and Product Defects	Improperly hung birds Bird uniformity Neck removal Empty shackles causing mis-feeds	Follow best management practices on farm to maximize uniformity. Train personnel in the importance of proper bird handling and equipment set-up. Adjust machinery as necessary on every flock.



Evis machine out of adjustment



Contamination and loss of yield from improper feed withdrawal



Fecal contamination from damaged intestine

The mission in this stage is to reduce the temperature of the birds as quickly as possible to reduce bacterial growth, maintain shelf life and enhance yield. Chilling can be done by water or by air systems. All birds must be chilled to 4°C (39°F); with most birds exiting the chiller at 2-3°C (36-37°F) or less.

Processing Plant Concern	Cause	Recommendations to Improve Issue
Product Exiting the Chiller At More Than 4°C	Temperature in the chiller system is too warm	Slow down the product flow through the system
	Dwell time is too short	Expand the system to meet capacity needs
	Improper water flow	Make sure water flow is counter to bird direction with the coldest water on the coldest birds first.

Water Chilling

Advantages	Disadvantages
<ul style="list-style-type: none"> • Maintains yield • Initial cost • Upkeep cost • Utility cost • Size (floor space) • Dwell time • Better BTU transfer • Consistent temperature 	<ul style="list-style-type: none"> • Moisture fluctuation • Market perception • Product commingles • Labor cost to rehang • Not user friendly to technology integration

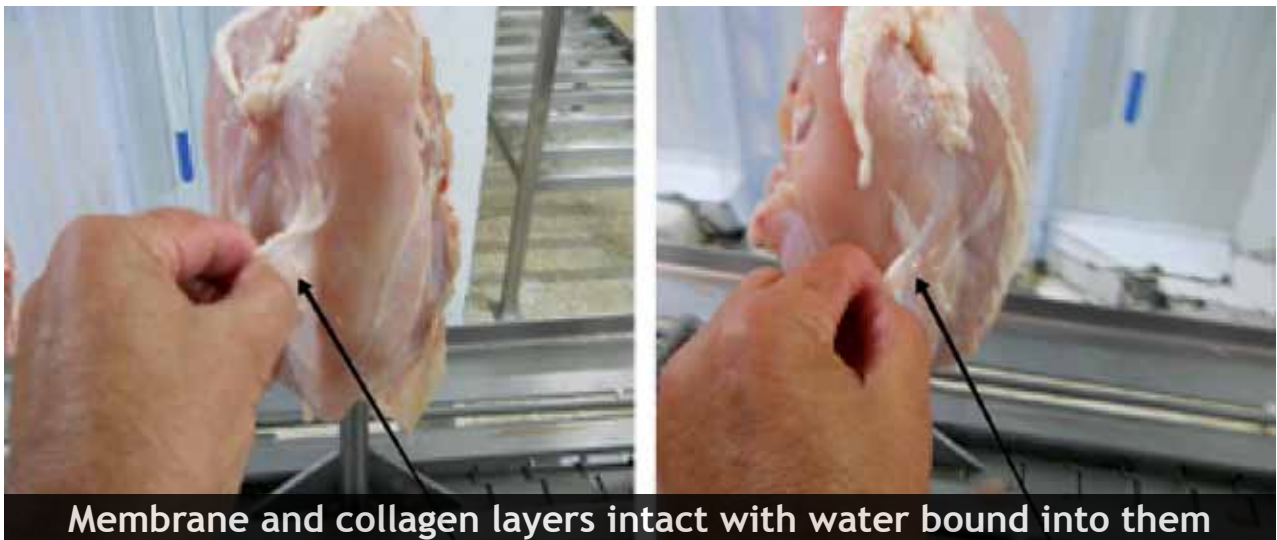
Air Chilling

Advantages	Disadvantages
<ul style="list-style-type: none"> • Labor reduction with auto rehang • Product identity • No commingle • Market perception • Technology integration • Possible application for in-line aging 	<ul style="list-style-type: none"> • Initial cost • Yield loss-shrink • Dwell time • Floor space • Product appearance • Possible inconsistent chill

Proper Scalding/Chilling

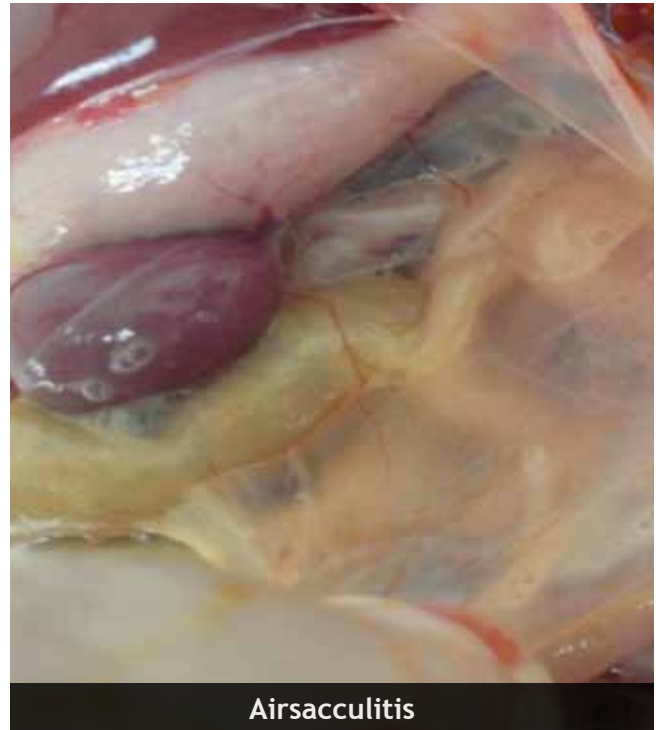


Proper Scald/Chill



Bird health can have a direct impact on processing yield and condemnations. Top quality carcasses can only be obtained from live birds in good health and therefore good care and best management practices during the grow-out period of the birds are critical to ensure the best carcass quality. Poor management conditions can affect broiler health as they can lead to unevenness, airsacculitis, septicemia, myopathies, pododermatitis, infectious process (IP), and some other problems that can diminish carcass quality and affect both bird performance and plant performance. Some disease agents can also cause unevenness, airsacculitis, septicemia, and even skin tumors. Any form of contamination of the poultry carcass lowers its quality and shortens the storage time as a wholesome product.

Health Concern	Effect on Meat Yield at Plant	Areas to Evaluate to Prevent Issue
Cellulitis or Inflammatory Process (IP)	It can be a major cause of condemnation. High numbers of carcasses having to be re-processed.	Type I: Hatchery origin: E. coli contamination of day-old chicks Type II: Scratches origin: High bird density, excitability, bird migration within the house (migration fences help). After 7-8 days of age keep light intensity down to 5-10 lux; use flash lights to weigh or walk the houses if needed; don't spike lights up at any time. Vit E supplementation can help skin integrity.
Septicemia or Sep/Tox	Carcass condemnation	Respiratory disease and reactions: Prevent vaccine reactions (vaccination techniques and equipment), maintain proper ventilation, prevent stress and E. coli secondary infections.
Airsacculitis	Condemnation	Respiratory disease and reactions: Prevent vaccine reactions; review vaccination techniques, maintain proper ventilation; Mycoplasma control (MG and MS).
Synovitis	Quality downgrade or complete carcass condemnation if sep/tox also present	Prevent lameness: Proper Ca-P-Vit D balance; prevent excessive early growth; watch for high levels of roxarsone.
Pododermatitis	Paw condemnation	Inadequate ventilation: Wet litter; high bird density. Whole house brooding helps prevention.



Health Concern	Effect on Meat Yield at Plant	Areas to Evaluate to Prevent Issue
Tumors	Condemned carcass	<p>Squamous cell carcinoma: Prevent IBD and CAV immunosuppression</p> <p>Skin Marek's: It can be seen in broilers over 45 days of age and raised on reused litter. Marek's vaccine available for broilers (1500 pfu's of HVT strain).</p>
Deep Pectoral Myopathy (Green Muscle Disease)	Tender condemnation, carcass downgrading	Prevent excessive flapping at the farm, during transportation or at the plant. Keep birds calm upon hanging at the plant by maintaining low light intensity.
Back myopathy	Carcass downgrading	Unknown cause, mostly seen in heavy birds (most likely mechanical origin).
Unevenness	Slow down the plant	Poor brooding, chicken anemia, infectious bursal disease, runting and stunting syndrome (RSS).
Ascites	Total carcass condemnation	Poor brooding temperatures, poor air quality, Aspergillus infections sourced from hatchery or contaminated litter.
Pendulous Crop	Condemned or trimmed carcass	Grind size too fine, high levels of copper sulphate, drastic Ingredient changes, Candida albicans (sour crop).



Deep Pectoral Myopathy



Uniformity issues



Ascites



Pendulous crop

Nutrition is an integrated part of being successful in the processing plant. Good nutrition must be supported by sound management practices, good chick quality, and healthy broilers. It is not possible to correct poor management or sickness with nutrition. However, there will be times where nutrition can impact the quality of the broiler presented to the processing plant, or can affect how well the product runs in the plant. The recommendations given below are given as part of an integrated, broad-based effort to improve yields.

Processing Plant Concern	Specific Effect on Meat Yield at Plant	Nutritional Recommendations to Improve Issue
Excessive Abdominal, Carcass, or Breast Fat	Poorer yields due to loss of leaf fat, excessive trimming of parts, liquefying of fat during scalding	Calorie-protein ratios should be approximately 141 kcal/kg (64 kcal/lb.) in starter feed, 159 (72) in grower, and 172 (78) in finisher. Adjust available lysine in starter to 0.39/1000 kcal/kg (0.86/kcal/lb.), 0.34 (0.74) in grower and 0.30 (0.66) in finisher, and set amino acid ratios according to lysine (see 2012 nutrition supplement).
Bloody Legs (Drums), Thighs, or Overall Bruising	Condemned or over-trimmed parts	All feeds should be less than 20 ppb aflatoxin (capillary fragility). Clean all feed mill and farm holding bins, fill lines, and pans. Add a mold inhibitor (propionic acid is the most practical) to the feed ration. Verify that vitamin E (membrane integrity) levels are 80 IU per Kg of feed, minimum; verify vitamin A (epithelial development) at 13,000 IU per Kg. An extreme measure would be ascorbic acid (collagen synthesis) added to feed.
Broken Bones in the Processing Plant (Shanks, Clavicles, Rib Cages)	Condemned or over-trimmed parts	Verify that calcium and available phosphorus levels analyze to meet the Cobb recommendations (2012 nutritional supplement). Vitamin D3 should meet or exceed 5000 IU per Kg of feed throughout the growing cycle. Avoid using vitamin- and mineral-depleted (low cost) diets at the end of the cycle. Evaluate intestinal tracts (at processing plant) to verify that no coccidiosis or enteritis is present (malabsorption issues).

Processing Plant Concern	Specific Effect on Meat Yield at Plant	Nutritional Recommendations to Improve Issue
Breast Meat Recovery Is Poor	Poor breast meat yield	Do not underfeed the broilers on protein and amino acids. Use the 2012 Cobb nutritional guidelines for optimal yield and economic return. Make sure feed electrolyte levels support good growth and water intake. Sodium levels should be 0.15%, minimum, during the entire growing period.
Poor Carcass Uniformity	Carcasses are condemned for septonx, or they are damaged by automated equipment due to mis-size. Sales histogram is impacted with each poor flock.	Uniformity issues start early in life, possibly from poor early feed intake. Assuming chick quality and management are good, make sure starter feed analyses match theoretical. Verify that crumbles are presented to the birds that are processed in the feed mill at 85°C (185°F). Crumbles should be 80 percent homogenous, and should be made from pellets 4.37mm (11/64") or smaller in diameter. Use an animal protein in the starter feed if available, in order to reduce soybean meal level and gut stress. If RSS-like symptoms, consider evaluating a heat-stable, bacillus-based probiotic.



Animal welfare is a critical component and everyone's responsibility. Good welfare (handling, daily care and management practices, animal health, equipment maintenance, etc.) can result in good performance, good livability of the birds and good quality meat yield at the processing plant. Conversely, poor management of welfare-related aspects (training, equipment, protocols, etc.) can result in incredible losses in meat yield and potential concerns with inspectors/auditors involved in meat quality and animal welfare. For all of the concerns listed below, it is important to consider the quantity (%) of birds with the concern or characteristic in the flock, the frequency of the situation, and the severity of the infraction.

Animal Welfare Concern	Effect on Meat Yield and Carcass Quality at the Plant	Areas to Evaluate to Prevent Issue
Skin Scratches (Fresh)	Quality downgrade for carcass with skin	<p>Catching: Number of birds/hand; poor quality of coops; number of birds per coop/module; improper catching method.</p> <p>Unloading: Too many birds unloaded on belt at the same time at plant; stressful environment (lights, noise) at unloading.</p>
Skin Scratch (Scar/Scabbed)	Quality downgrade or condemned carcass	<p>Farm: Feed distribution and timing are not adequate and birds run 'out' of feed; limited feeder space/bird; high bird density; high light intensity or environment resulting in flightiness; health status of flock (bacterial pressure); type of bedding used for litter.</p>
Broken Wing, Leg or Keel	Quality downgrade with need to 'rework' carcass or condemned carcass	<p>Equipment: Check quality and maintenance of coops, modules or unloading equipment, or on-farm equipment.</p> <p>Staff: Training not adequate for bird handling and care. Check for rough method used when catching/loading/unloading. Check on-farm culling practices for injured birds.</p>
Head/Neck Damage	Quality downgrade or complete carcass condemnation	<p>Equipment: Check quality and maintenance (example: cage doors fitting inadequately that can cause injury or trauma).</p> <p>Staff: Training not adequate for bird handling during catching/loading/unloading procedures.</p>

Animal Welfare Concern	Effect on Meat Yield and Carcass Quality at the Plant	Areas to Evaluate to Prevent Issue
Pododermatitis, Hock Lesions and Feather Damage	Potential concerns with Ministry inspectors or welfare auditors in plant; quality downgrade; condemned carcass	<p>Bedding/Litter: Material used is not adequate (check depth, type, absorptive quality) to allow birds to be on dry surface.</p> <p>Nutrition: Feed quality and/or content is not correct resulting in 'flushing' or excessive water consumption.</p> <p>Health: Avian health concerns (enteric disease due to bacterial, viral or parasite cause) resulting in suboptimal absorption of feed and/or abnormal fecal consistency; low bird activity and mobility resulting in increased litter contact time.</p> <p>Farm Management: Ventilation and/or drinker system is not adequate to reduce moisture, ammonia or to dry out litter; high bird density; inadequate insect control; lighting or husbandry practice resulting in poor environmental control.</p>
DOA	Condemned carcass and potential concerns with Ministry inspectors if local limits are exceeded	<p>Total time, Conditions and Ambient temp: During catching, loading, transport, lairage at plant and pre-stunning.</p> <p>Equipment: Check quality and maintenance.</p> <p>Staff: Training and guidance given based on weather conditions and bird size/numbers for catching and loading.</p>
Temp Stress	Poor bleed out of carcass; carcass shrink; condemned carcasses or higher DOAs	<p>Ambient temp too <u>cold</u>: Can result in DOA during transport or lairage; poor bleed-out after stunning; carcass condemned.</p> <p>Ambient temp too <u>hot</u>: Can result in stress and lead to DOAs; carcass shrink due to dehydration; irregular carcass coloration.</p>

One of the best tools to determine how different breeds will perform in your operation is a broiler yield trial run under commercial conditions. The purpose of any yield test is undoubtedly to determine which broiler cross will give you the most meat yield and how that yield is distributed within the carcass. The yield test itself will not tell you what breed you should use, but combined with the live production data such as weight, livability, feed conversion and other factors it can give you the most accurate information.

Please refer to the “Commercial Yield Testing” Technical Focus paper at Cobb-Vantress.com for more details.

Yield Test protocol	Effect on Meat Yield at Plant	Recommendations to improve accuracy
Farm and Flock Selection	Providing accurate data by removing as many variables as possible from the test flock	<p>Hatch chicks of the compared breeds from breeder flock sources as close to the same age as possible. Ideally, the breeder sources should be from 38-42 weeks of age.</p> <p>Chicks should be hatched in the same hatchery and delivered to one farm on the same day. Placement ideally would be in 2 or 4 side-by-side houses with the same brooding, feeding, watering and ventilation equipment.</p> <p>Flock should be grown using the same feed formulation and delivery in all houses. Feed deliveries for competing breeds on the farm should be kept separate to gain FCR data.</p> <p>Mortality should be kept separate by house.</p>
Yield Trial Bird Selection (Restricted Random Sampling Method)	Insures birds in the test are an accurate representation of the breeds involved	<p>Test birds should be chosen to be tested on the day of the normal processing for the flock.</p> <p>Birds should be selected (when possible) from two houses which are the most similar in performance (mortality, performance issues during rearing, etc.).</p> <p>Mean weights are compiled by weighing three pens per house, each end and the middle, and weighing at least 100 females and 100 males per house.</p>

Yield Test protocol	Effect on Meat Yield at Plant	Recommendations to improve accuracy
(Continued...) Yield Trial Bird Selection (Restricted Random Sampling Method)	Insures birds in the test are an accurate representation of the breeds involved	Sample birds are then selected from the general population according to their weight proximity to the mean weight. 8 birds of each sex from ± 1 SD above and below the mean weight; 4 birds from each sex from ± 2 SDs above and below the mean weight. Birds should be tagged for identification and placed in a separate pen with feed and water, and taken off feed at the same time as the rest of the house.
Plant Weighing	Re-weighing of the birds at arrival at the processing plant gives an accurate off-feed live weight for more accurate eviscerated %	Birds are weighed individually upon arrival at the plant, weight recorded matching their ID tag applied at the selection process, and then returned to the plant for slaughter.
Gathering Test Birds Inside the Processing Plant	Birds are removed from the evis line PRIOR TO THE CHILLER and re-weighed to get an eviscerated yield %	Birds are gathered for a “hot” cut-up (no chilling) to eliminate differences in water pick-up as the birds go through the water chiller or moisture loss in a dry chill system.
Cutting and Weighing	Gives accurate yield percentages of parts of the bird	All deboning or cut-up should be performed by the same people to reduce technique differences. Cut-up protocol should match the products sold at that plant to give the true value of yield as it applies to that location. Data is collected and analyzed to determine yield percentages of specific products.