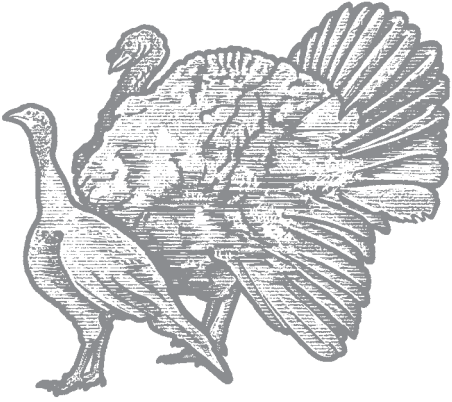
MANAGEMENT ESSENTIALS

for Breeder Turkeys



Nicholas

TABLE OF CONTENTS

For further information on raising Nicholas turkeys, contact your local technical service representative or a Nicholas sales office.

Nicholas Turkeys
31186 Midland Trail, East
Lewisburg, WV 24901
USA
Tel: +1 304 793 2680
Fax: +1 304 793 2684

Nicholas Europe
18 Bayview Road
Aberdeen AB15 4EY
Scotland, United Kingdom
Tel: +44(0) 1224 322244
Fax: +44(0) 5601 130353

Email: nicholas@aviagen.com www.nicholas-turkey.com

INTRODUCTION

Nicholas Turkeys is a primary breeding company that develops pedigree lines of birds for the global turkey industry. Through the application of advanced technologies and unique systems in the breeding program, Nicholas is able to utilize a balanced approach to genetic progress. This allows for continuous improvement in both reproductive and commercial traits such as poult production, live weight, feed efficiency, and meat yield, as well as welfare-related traits such as fitness, cardiovascular health, and leg strength.

Achieving this increasing genetic potential depends on:

- An appropriate environment, including temperature and air quality, which meets the birds' requirements.
- A dietary regime that provides nutrients, in both feed and water, in an appropriate profile.
- An effective biosecurity and disease control program.

All of these are interdependent. If any of these elements are sub-optimal, performance will suffer.

The aim of this booklet is to assist producers of Nicholas turkeys to achieve optimum performance from their birds. It draws attention to essential management issues, which if overlooked, may depress flock performance.

Information presented in this booklet combines the collective data derived from internal research trials, published scientific knowledge, and the expertise, practical skills, and experience of the Nicholas technical service team.

While every attempt has been made to ensure the accuracy and relevance of the information presented, Nicholas accepts no liability for the consequences of using this turkey management information.

BIOSECURITY

Maintaining a healthy flock is a challenge in the best of circumstances. There are numerous ways to introduce disease organisms into a flock as well as many diseases which affect turkeys. Producers must have a strict set of rules designed to prevent poultry from being exposed to infectious diseases. This is the very definition of biosecurity.

An effective biosecurity program requires identifying the most likely sources of disease, and establishing practices designed to suppress the introduction and spread of these pathogens into flocks.

Following are a few important tips for maintaining this type of rigorous biosecurity program at your facility.

- Educate your staff. People can be one of the most effective vectors of poultry disease.
- Avoid contact with backyard chickens, waterfowl, quail, wild turkeys, pheasants, companion birds, fighting cockerels, and other birds. **DO NOT** visit live bird markets (flea markets) or people associated with them.
- Practice an all-in / all-out policy for stocking farms if possible. If the introduction of new birds in an existing flock is unavoidable, first seek information on the health status of the new birds.
- Monitor mortality closely and report any suspicion of disease to production managers and/or company poultry veterinarians.
- Permit only essential staff and vehicles to enter the farm.
- Keep vehicle traffic (egg and feed trucks and farm staff transportation) to a minimum.
- Ensure any vehicle that must enter a farm is clean.

Spray tires with disinfectant before entry to the farm. Disinfect the floorboard if any occupant is allowed out of the vehicle on the farm.

- **DO NOT** share staff between different species farms and preferably not even between poultry farms housing the same species.
- Ensure that all personnel and visitors entering farms follow the specific sanitation procedures for that facility (showers, changing in to clean farm clothing, etc.) and that their entry is recorded.
- Use footbaths with disinfectant at the entrance to all poultry buildings.
- Ensure all poultry houses are wild bird proof.

SECTION 1. BROODING

Objectives

To provide an environment from day one that will encourage activity, feed consumption, and growth.

To minimize stresses that negatively impact future growth or reproductive potential.

PRE-PLACEMENT:

Facility

- Place on single-age farms to reduce disease risk.
- Properly clean and disinfect house after each flock.
- Ensure there is a rodent and pest management plan in place for the farm.
- Allow only authorized visitors that have met biosecurity requirements on the premises.

Shavings

- Use a clean, dry mixture of coarse and fine softwood shavings. Avoid hardwood shavings and wet sawdust.
- New shavings are recommended for every flock.
- Spread evenly at 3 to 4 inches (75 to 100mm) depth.
- Smooth to level within rings prior to setting up equipment.

Rings

- Use new 12 or 15-inch (300 or 400mm) solid cardboard material for ring construction. **DO NOT** reuse cardboard.
- Wire mesh may also be used for rings which can improve ventilation, particularly in hot weather. When using wire, avoid drafts and carefully clean and disinfect before reuse.
- Ring size should be a minimum of 14 feet (4.25m) in diameter with an area of 150ft^2 (14m^2) for a single stove.
- One or two stoves can be incorporated into each ring, depending on the situation.
- Design should be round or oval and have no corners.

- Suspend stove level to the litter and in the center of the ring to provide a uniform “hot spot” as well as a uniform temperature at edge of ring. *Remember to use safety chains in case a cable breaks.*
- No more than 400 hens or 300 toms should be placed per stove. Fewer poults per stove will reduce competition for resources.
- Construct one extra ring (“hospital ring”) for every 5,000 poults housed. Raise brooder stove 12 inches (300mm) higher, and place supplemental feeders to create an environment sympathetic to weak or “flip-over” poults.

Water

- Clean and disinfect waterlines after every flock. (See Section 11, Cleaning and Disinfection, **Water**)
- **DO NOT** add vitamins or antibiotic at placement (unless for a specific, known problem).
- Provide one bell-type drinker per 100 poults or manufacturer recommended number of poults per nipple if using nipple drinkers.
- Position each drinker at least 12 inches (300mm) from the stove and/or brooder guard.
- Level drinkers to avoid floods while making sure poults have good access to drinkers.
- Adjust automatic depth to 3/4 inch (20mm); hand fill to lip prior to placement.
- If using nipple drinkers, use double rings (two rings combined) to avoid nipples at the edge of the rings.
- Allow poults to settle down after delivery before lowering nipple lines into rings.

Feed

- Pre-starter crumble should be consistent in size with minimal fines.
- Provide one 48 inch (1.2m) trough-type feeder per 100 poults to equal 1 linear inch (25mm) per poult; or provide a combination of 18 inch (0.5m) supplemental feeders and bucket type - 100 poults per one bucket and one 18 inch (0.5m) supplemental feeder.

- Position feeders at least 12 inches (300mm) from stove and/or brooder guard.
- Fill feeders with fresh feed immediately prior to placement.
- Consider supplementing 48 inch (1.2m) trough-type feeders with 18 inch (0.5m) red feeders while poults are in rings for optimum feed consumption.
- Remove any wet or soiled feed from feeders daily.

Brooder Stoves

- Confirm that each stove is operating properly.
- Light stoves 24 hours prior to poult arrival to warm room and shavings. At a minimum of 12 hours prior to poult arrival, set stoves to reach starting target temperature.
- Target a 3 to 4 foot (1.0 to 1.3m) "hot spot" of 110 to 115° F (43 to 46°C) in the center of the ring.
- Adjust all stoves to desired height above the litter:
  - **>** Conventional - 24 inches (0.6m)
  - **>** Infrared - 40 inches (1m)
- Confirm that the cycling of each stove provides a hot spot of no less than 105° F (40°C) and no more than 115° F (46°C) at any time.
- Set zone controlled systems so that the majority of stoves are within target range. Stoves that are hotter or cooler than the target should be physically raised or lowered to achieve the desired temperatures.
- Stove and ventilation adjustments should result in a temperature gradient of a maximum of 30° F (12°C) between the hot spot and the perimeter of the ring when the stove is running (measured at bird level).
- Check propane level in tank.

Ventilation and temperature control

- Confirm that stoves are properly set and that all ventilation equipment is operational.
- Calibrate all thermostats to provide accurate settings.

- Set fan thermostats according to target temperature, **see Table 1**. Thermostat fans should begin to come on at 2° F (0.75°C) above target temperature.
- Adjust ventilation to provide the minimum cubic feet per minute (CFM) required according to the lowest anticipated outside temperatures.
- With fan timers "off", the minimum ventilation thermostats should not operate desired fans for more than 20% of the time. If minimum ventilation fans (stage 1) run for:
  - **> more than** 20%, adjust target temperature up in increments of 2° F (0.75°C).
  - **> less than** 20%, adjust target temperature down in increments of 2° F (0.75°C).
- Adjust all vents to the same size opening. For wintertime ventilation a portion of vents may need to be closed off completely.
- Seal cracks and areas where air can leak in causing drafts and heat loss.
- Set background heat source(s) at 3° F (1.0-1.5°C) less than target temperature.

Lighting

- Use one 75 or 100 watt brooder light per stove to prevent shadows and attract poults to heat source. Use only while poults are in rings.
- Provide a minimum of 5 footcandles (50 lux) of light in house.
- Provide poults with full light for the first 24 hours. Afterwards, provide 6 to 8 hours of continuous darkness per night.

PLACEMENT OF POULTS & DAY ONE

Placement

- Place as early in the day as possible and provide poults with full light for the first 24 hours.

- Move quickly through house every hour (or more if needed) to check activity of poults, confirm that all equipment is operating correctly, and make any necessary adjustments.
- Remove weak poults and “flip-overs” from rings and place in “hospital rings.” (see Section 1, Rings)
- Minimize excessive noise and activity in the brooding area.

Water

- Hand-fill drinkers at least twice daily as needed to keep them fresh and full.
- Clean as needed throughout the day to remove shavings and manure.
- Adjust height as litter settles to ensure easy accessibility.
- Empty, clean, and refill drinkers prior to the end of the day.

Feed

- Adjust and level as needed to ensure constant accessibility.
- Minimize shavings and manure in feeders.
- Add fresh feed by the end of the first day, or sooner if needed.

Heat

- Confirm each stove is working properly. Hot spot temperature should not fall below 105° F (37°C) during the hottest part of the day or rise above 115° (46°C) during the coolest part of the day.
- Adjust individual stove settings according to poult activity and feed and water consumption.

Ventilation

- Maintain target background temperature and static pressure.

Lights

- Provide poults with full light for the first 24 hours.
- Provide a minimum of 6 to 8 hours light after first 24 hours.
- Allow poults to bed down with natural light (if applicable).

TROUBLE-SHOOTING POULT PROBLEMS

Poults huddling or chirping loudly

- Excessive house temperatures make it more difficult for poults to find the hot spot provided by the brooder stove.
- Excessive heat may be radiating up from the floor to the poults. If the floor is too hot, add more shavings or expand the ring diameter.
- Confirm that there is a minimum 10° F (5°C) variation from hottest to coolest areas of the ring when the stove is not running.
- Adjust stove height and/or thermostat and ventilation to target proper variation.
- Ensure that maximum temperature under the stove does not exceed 115°F (46°C) during the coolest time of day.

Excessive flip-overs or weak poults

- Can be caused by over-heating in hatching, transport, or early brooding of the poults.
- Place all weak or flip-over poults in “hospital rings.” (see Section 1, Rings)
- Ensure ample water and feed supply.
- Temperature should not exceed 100° F (37°C) within the ring, except in the hotspot.
- Return recovered poults to general population.

Poults are not drinking

- Either they cannot drink or do not feel like drinking.
- Ensure drinker height and depth are adjusted properly and that water is fresh.
- Manually fill bell type drinkers to the top (running water will attract poults, as will the reflection on the top of the filled drinker).
- Test chlorine level in drinkers to ensure no more than 3 to 5 PPM free chlorine. If using an Oxidation Reduction Potential (ORP) meter, the reading should be a minimum of 650.
- Ensure no residual disinfectant or other chemicals are in the system.

- Ensure that the environment in the ring provides adequate temperature, fresh air, and lighting.

Poults are not eating

- Either they cannot eat or do not feel like eating.
- Manually fill all feeders to the top to enable poults to see feed.
- Stir, top-off, or replace feed in feeders. The smell of fresh feed will attract poults.
- Check for excessive level of salt in feed.
- Ensure that the environment in the ring provides adequate temperature, fresh air, and lighting.
- Avoid attempts to stimulate poults with human activity; this may make the situation worse.

DAYS TWO THROUGH SIX

Litter

- Remove caked and wet litter daily.
- Stir litter around and underneath equipment.
- Add new shavings as needed.

Water

- Empty, clean, and move drinkers at least daily.
- Adjust depth to maintain 3/4 inch (20mm).
- Adjust height to maintain lip of drinker at the average poults' back.
- Gradually remove supplemental drinkers (25% per day) and adjust as needed to keep clean and manageable.
- Minimize spillage.

Feed

- Do everything possible to encourage the consumption of feed.
- Dispose of contaminated feed daily.
- Move feeders as needed to minimize litter buildup.
- Refill and top off feeders in the morning and evening (more often if needed) to help develop eating patterns.
- Minimize spillage of feed into the litter.

- Assuming automatic feeders are accessible, gradually remove supplemental feeders (25% per day) beginning on the 4th day.

Heat

- Maintain temperature gradient and poult activity.
- Make adjustments during the coolest part of the day.

Ventilation

- Maintain minimum ventilation.
- Adjust as needed to maintain background target temperature and static pressure.
- Make adjustments during the coolest part of the day.

Lights

- Provide a minimum of 14 hours of light per 24 hour period.
- Reduce intensity depending on activity, feed consumption, and cannibalism.

Rings

- Combine rings as appropriate (after 3 days).
- Utilize rings through a minimum of 5 days.
- Make all changes in ring configuration early in the day.

SECTION II. WEIGHT CONTROL FOR HEAVY STRAINS

Objective

To control body weight to achieve optimum reproductive performance.

HENS

- Heavy strain hens should follow the weight targets as detailed in the *Breeder Weight and Feed Consumption* table in the product leaflet.
- At 3 weeks of age start weighing a random sample of at least 30 hens weekly to monitor growth against target.
- Adjust feeding program based on growth trend. **DO NOT** attempt rapid weight adjustments.
  - **>** Heavy flocks – accelerate move to next ration
  - **>** Light flocks – hold on higher protein ration longer
  - **>** Weight gain stalls due to high ambient temperature – move to higher protein ration to maintain desired growth
- Key ages and weights are at 6, 16, and 22 weeks. Ensure hens are on track to hit these target weights.
- At 16 weeks if birds are heavier than target draw a new target that runs parallel to the original line. **DO NOT** force birds back to the original target.
- Ensure hens are gaining weight at stimulatory lighting, even if they are slightly heavy.

TOMS

- Toms should follow the weight targets as detailed in the *Breeder Weight and Feed Consumption table* in the product leaflet.
- Toms must follow a feeding schedule nutritionally matched to their needs.
- Feed toms on the starter ration for at least the first 4 weeks.

- Monitor weight against the target and adjust the feeding program as necessary.
- Following final selection, feed diets which allow weekly weight gains without the toms becoming overly fat.
- Ensure toms are at least 50 lbs (22.5 kgs) at time of first semen collection.

For more information on weight control for replacement breeders, contact your Nicholas Technical Representative.

SECTION III. GROWING

Objectives

To provide an environment that allows the bird to reach performance goals.

To minimize stressors that negatively impact growth or reproductive potential.

Litter

- Till weekly or as needed to maintain litter quality and to optimize foot pad and leg integrity.
- Consider using a litter amendment for ammonia control in cold weather conditions.
- Utilize static pressure ventilation to control litter moisture and dust.
- **DO NOT** compromise litter conditions for fuel savings.

Water

- Provide one bell type drinker per 100 males and per 150 females.
- Change drinkers to adult bell by 5 to 6 weeks of age.
- Maintain depth at 1/2 to 3/4 inch (12 to 20mm), depending on drinker style, drinking activity, and litter conditions.
- Maintain lip of drinker even with height of the average birds' backs.
- Continue to chlorinate to target 3 to 5 PPM free chlorine in the drinker furthest from the source. If using an Oxidation Reduction Potential (ORP) meter, the reading should be a minimum of 650.
- Clean drinkers daily.
- During hot weather, flush overhead lines to provide fresh, cool water.

Feed

- Ensure feed is available when the birds are delivered.

- Feed to achieve the target weight profile. (see *Breeder Weight and Feed Consumption* table in the product leaflet).
- Provide 1 feed pan per 75 birds.
- Change to adult equipment (usually by 6 to 8 weeks of age) and adjust feed depth based on spillage and bird activity at feed pans.
- Maintain lip of feed pan even with the height of the average birds' backs.
- Check bins, augers, hoppers, etc. regularly for accumulation of moldy feed.
- In extreme heat consider withdrawing feed during the hottest part of the day to lower metabolic temperature and allow birds to handle heat better.

Heat

- After 7 days, begin to reduce heat input in increments of no more than 2°F (0.75°C) to achieve target room temperatures. **(see Table 1)**
- Use background heaters to help maintain room temperature once rings are removed; set thermostats at 3° F (1.5°C) below target room temperature.
- Utilize heat as needed to reduce litter moisture (with increased ventilation).
- **DO NOT** compromise temperature or air quality for fuel savings.

Ventilation

- Confirm that all ventilation equipment is operational.
- Calibrate all thermostats to enable accurate settings.
- Adjust fan thermostats according to target temperature. **(see Table 1)** Thermostat fans should begin to come on 2°F (1°C) above target temperature.
- Increase minimum ventilation to maintain air quality, reduce litter moisture, and to control ammonia and dust.

SECTION IV. CONDITIONING

Objectives

To provide an environment that will encourage proper development of reproductive organs and body reserves.

To minimize any stresses that negatively impact future reproductive potential.

HENS

Conditioning

- Provide adequate floor space to encourage activity and maintain fitness (see ***Breeder Floor Space*** table in the product leaflet).
- Feed to achieve target body weights not based on age or amount of feed. (see ***Breeder Weight and Feed Consumption*** table in the product leaflet)
- Maintain litter and ventilation to minimize dust and/or ammonia levels, optimize respiratory fitness, and promote activity.

Selection

- Remove birds with physical defects that may effect production between 16 and 18 weeks of age.

Lighting

- See lighting schedule detailed in **Table 2.**
- Provide a minimum of 12 weeks of reduced day length prior to lighting of hens.
- Maximize the differential in light intensity between light and dark periods of the day.
- Ensure integrity of darkout; inspect house regularly for light leaks.
- **DO NOT** allow hens to receive extra day length or increased light intensity at any time during this period.

TOMS

Conditioning

- Provide adequate floor space to encourage activity and maintain fitness (see ***Breeder Floor Space table*** in the product leaflet).
- After selection, minimum target weight must be achieved to ensure optimum semen production (see ***Breeder Weight and Feed Consumption*** table in the product leaflet).
- Maintain litter and ventilation to minimize dust, ammonia, and other respiratory challenges.

Selection

- Select birds between 16 and 18 weeks, depending on specific program requirements.
- Target selection of 25 to 50% of the day old number of toms eliminating birds based on:
  - **>** Fitness – defects affecting production and/or health problems.
  - **>** Leg Structure – mobility, gait, and posture
  - **>** Weight – light birds

Lighting

- See lighting schedule detailed in **Table 2**.
- Control light to prepare birds for production.
- Increase day length to a minimum of 14 hours between 16 and 18 weeks of age.
- Ensure integrity of light control; inspect house regularly for light leaks.
- **DO NOT** allow toms to receive extra day length or increased light intensity at any time during this period.

For more information on physical selection of male breeder candidates, contact your Nicholas Technical Representative.

SECTION V. EGG PRODUCTION

Objectives

To provide the nutrition, management, and environment required for optimizing the production of quality hatching eggs and poults.

To minimize stresses that reduce reproductive performance.
See* Eggs and Hatch *table in the product leaflet.

Facility

- Only house one age of laying hens in any one facility.
- House dimensions should provide floor space according to the ***Breeder Floor Space*** table in the product leaflet and should complement specific ventilation and equipment requirements.
- Place birds in completely cleaned and disinfected houses.

Ventilation

- Open-sided housing provides natural light and ventilation and is suitable for laying hens except in extreme conditions.
- Provide sidewall or circulating fans in hen houses to:
  - **>** maintain air quality and aid in litter moisture control during cooler seasons
  - **>** increase evaporative cooling and removal of body heat from the house in warmer seasons
- Positioning of fans will depend on house dimensions, equipment layout, and size of fans.
- Operate fans to target maximum differential in daytime versus nighttime temperatures, particularly during hot seasons.

Feed

- See the ***Feeding Program*** table in the product leaflet for nutritional recommendations.

- Overhead fill systems are preferable for minimizing injuries to birds and for logistical reasons.
- Provide adequate feeder space. The number of birds per pan is dependent upon the type of equipment used.
- Feed equipment should minimize pellet damage, and provide for frequent turnover of feed to maintain freshness.
- Positioning of feeders should encourage hen movement and should not expose feed to sunlight or moisture from sidewalls or misting systems.
- Regularly inspect bins, augers, and feed pans for caked or moldy feed and operation.

Water

- Clean and disinfect waterlines after every flock. (See Section 11, Cleaning and Disinfection, ***Water***)
- Provide water with bell or pan type drinkers at no more than 100 hens per drinkers.
- Positioning of drinkers should encourage bird movement and should not expose water to direct sunlight.
- Empty and wash drinkers at least daily, more often during hot weather.
- Plumbing should allow for flushing of system with cool water during hot weather and draining of system during cold weather.

Nests

- Provide nest space at no less than one semi-trapped nest box per 5 or 6 hens.
- Position nests to maximize accessibility and allow for broody identification and control procedures.
- Make nests available 24 hours per day beginning no later than 7 days post-lighting.
- Tie open spring-type semi-traps from the time nests are opened until egg production reaches 25 to 35%. Thereafter, untie them gradually over 3 to 4 days.
- Have clean and dry bedding in conventional nest boxes.

- Specific advice regarding mechanical nest management is available from the nest manufacturer and your Nicholas Technical Representative.
- Restricting the hens' access to nests and/or nesting area by using nets or panels will influence egg lay pattern and broody behavior.

Lighting

- See lighting schedule detailed in **Table 2**.
- Lighting fixtures should provide a light intensity of no less than that provided during the conditioning (dark-out) stage.
- Space light fixtures to minimize shadows, particularly along walls and in corners of the pens.
- Determine breeder hen lighting based on the following considerations:
  - **DO NOT** light hens prior to 29 weeks, or before they have achieved the recommended lighting weight.
  - Provide a minimum of 14 hours day length at lighting, with the maximum determined by natural day length.
  - **DO NOT** expose hens to a decrease in day length or intensity after lighting.
  - When changing the light period, target maximum morning light, with evening lights not extending more than 1 hour post sunset.
  - Always make increases in the light period in the morning.

Early (pre-peak) Management

- Increase frequency of nest egg collections as the number of eggs increases, pushing hens completely off of and away from nests.
- Begin hourly egg collections by the time eggs are saved for setting.
- Begin saving eggs on the day (24 hours) following the 2nd insemination.

- Minimum settable egg size should be 71 grams for heavy strains and 68 grams for medium strains.

SECTION VI. SEMEN PRODUCTION

Objectives

To provide the nutrition, management and environment required for optimizing the production of quality semen.

To minimize stresses that reduce the reproductive performance of breeder toms.

Facility

- Breeder stud facilities require multiple ages to be housed together.
- Biosecurity and health programs must be considered due to the increased risk posed by multi-age facilities.
- Place birds in completely cleaned and disinfected houses.
- House dimensions should provide floor space according to the ***Breeder Floor Space*** table in the product leaflet and should complement specific ventilation and equipment requirements.

Ventilation

- For breeder toms, closed, power ventilated housing is recommended to provide optimum control over air quality and lighting.
- Cold drafts must be avoided at all times.
- The house temperature should not fall below 58° F (14°C) because lower temperatures will adversely effect semen production.

Feed

- See ***Feeding Program*** table in the product leaflet for nutritional recommendations.

- Control feed toms to manage body weight and optimize semen production.
- Provide a minimum of 14 linear inches (35 cm) of feeder space per tom if they are control fed.
- Provide one feeder per pen of toms that are full fed.
- Feed equipment should minimize pellet damage, and provide for frequent turnover of feed to maintain freshness.
- Regularly inspect bins, augers, and feed pans for caked or moldy feed and operation.
- When feed restriction is used; regularly re-calibrate weighing equipment.

Weight

- Follow the weight targets outlined in the ***Breeder Weight and Feed Consumption*** table in the product leaflet in the leaflet for optimum reproductive performance.
- Ensure toms weigh at least 50 lbs (22.5 kgs) at the time of first semen collection.

For more information on weight control for replacement breeders, contact your Nicholas Technical Representative.

Water

- Clean and disinfect waterlines after every flock (See Section 11, Cleaning and Disinfection, Water)
- Provide water with bell or pan type drinkers at one per pen.
- Positioning of drinkers should encourage bird movement and should not expose water to direct sunlight.
- Empty and wash drinkers at least daily, more often during hot weather.
- Plumbing should allow for flushing of system with cool water during hot weather and draining of system during cold weather.

Lighting

- See lighting schedule detailed in **Table 2**.
- Lighting fixtures should provide a light intensity of no less than that provided during the conditioning (dark-out) stage.
- Space light fixtures to minimize shadows, particularly along walls and in corners of the pens.
- Determine breeder tom lighting based on the following considerations:
  - **>** Ensure integrity of light control; inspect house regularly for light leaks.
  - **>** Provide gradual increases in day-length throughout the production period to maintain semen production.

If multi-age toms are in the same house, this procedure may need to be modified.

- **DO NOT** expose toms to a reduction in day length or light intensity during the production period.

SECTION VII. INSEMINATION

Objectives

To collect the maximum quantity and quality of semen from breeder toms.

To inseminate the required dosage of **live spermatozoa** *into each hen.*

To ensure optimum fertility of eggs produced with minimal loss of egg production due to the stress of the process.

Pre-milking

- Firm, but gentle, handling of the toms throughout the production cycle will improve longevity of semen production.
- Clip feathers immediately surrounding the vent area.
- Use proper cloacal massage technique, and use only 2 "squeezes" per tom during any one collection.
- Pre-milk all toms 1 to 2 times prior to their semen being used to inseminate hens.

Semen Collection

- For optimum semen production, milk toms 1 to 2 times per week throughout the production cycle.
- Ensure the milking process is confined to the normal flock day-length and that adequate light is available.
- Wipe clean the vent area prior to collecting semen.
- **DO NOT** collect yellow or bloody semen, or any semen containing urates or fecal material.
- Ensure semen collection equipment is sterile, dry, and warmed to room temperature prior to collecting semen.
- Semen filtering equipment **does not** reduce the importance of collecting only quality semen.
- **DO NOT** allow semen to contact the skin around the vent or the collectors' finger while milking.

- Collect semen directly into sterile, room temperature extender, generally resulting in 33 to 50% extender.

Semen Handling

- Each vial of semen must be thoroughly and evenly mixed after it is collected before checking cell concentration.
- **For optimum fertility**, completely use semen within 30 minutes from the start of milking.
- Semen can be stored for up to 6 hours prior to insemination, but this requires strict control of holding conditions and modification of dosage calculations.

Contact your Nicholas Technical Representative for detailed information on ratio of semen extender, semen quality evaluation, and calculation of proper semen dosages.

Insemination

- See **Table 4** for recommended semen dosages relative to age of the flock.
- Ideally, schedule insemination to be completed a minimum of 4 hours prior to, or begin after, the day's peak egg production.
- Coincide the first insemination with the majority of hens squatting, and immediately prior to first eggs. Generally, this will be between 14 and 16 days after lighting.
- At least 95% of hens should be easily everted at 1st insemination. **DO NOT** break through hymen with insemination straw.
- Do the second insemination within 3 days of the first, with the third scheduled for 7- 10 days after the first. Thereafter, weekly inseminations are the standard.
- During the insemination process, handle hens firmly but gently to avoid excessive stress.
- Setup the insemination process based on ease and efficiency of operation for both people and hens.

- **Monitor and record ALL** details of the insemination process, from milking to insemination, to assist in troubleshooting potential fertility issues.

SECTION VIII. BROODY CONTROL

Objectives

To prevent broodiness.

To identify and effectively treat individual hens that exhibit broody characteristics in a timely manner, and without excessively stressing the flock.

To maintain and maximize the egg production performance of the flock as a whole.

Characteristics of broodiness (listed sequentially)

- Difficulty pushing the hen off of the nest
- Peak egg production shifts to later in the day
- Reduced lay frequency
- Shrinking of width between pelvic bones
- Loss of weight, including abdominal fat pad
- Cessation of lay

Methods of identifying broody hens

Option 1

- Mark all nesting hens after the 1st collection of the day. All marked hens that are still found on the nest 6 to 8 hours later are potentially broody.

Option 2

- Mark all nesting hens before the last egg collection of the day. The next morning, after all roost eggs have been collected, all marked hens found on the nest before the first egg collection are potentially broody.

Procedures to mark hens

- Begin 7 to 10 days after first egg is laid (earlier during warm weather).
- Use water based food coloring.

- Mix solution so residual color on hens lasts no longer than 7 days.
- Use a different color on a different part of the hens each day (i.e., wing, neck, back, and tail) to improve accuracy and effectiveness of the program.
- Ensure all staff knows the sequence of colors by using color chart.

Treatments

(listed based on least amount of stress on the flock)

- **Restrict access to nests:** drop a net or close traps at night starting at the first day of saving eggs.
- **Pen switch:** move broody hens and/or late layers to a different pen in the same house.
  > Move to a pen that is opposite or diagonal from the original pen
  > On the 21st day of saving eggs, pen switch "late layers" two times per week (three times per week in summer months).
- **Broody pens:** move identified broody hens to remote pens, providing a change in environment.
  > Use 3 separate broody pens, 1 for each of 3 days.
  > Move broody hens from the main flock to the Day 1 broody pen.
  > Walk through the broody pens hourly and move squatters or hens which are about to lay an egg back to the main flock.
  > At the end of the day, move hens which are still broody in the Day 1 pen to the Day 2 pen; move broody hens in the Day 2 pen to the Day 3 pen.
  > After 3 days in the broody pens, either return hens to the main flock or return them to the Day 1 broody pen for continued treatment.

Broody Pen Design

> Provide broody pen space at the same square footage as the rest of the house. **Warning: Over-crowded hens will go out of production due to floor huddling, excessive heat and damage to hens.**

> Provide fresh feed, fresh water, good ventilation, and light intensity at least as bright as the flock pens.

> Floors of broody pens may be different from the flock pens only if legs or footpads are not harmed.

> **DO NOT** provide nests in broody pens, especially in the Day 1 and Day 2 pens.

• **Pen switching the entire flock** may be used as a method for controlling broodiness, however timing and procedures are critical. *Contact your Nicholas Technical Representative for more information if you believe this method is required.*

SECTION IX. EGG HANDLING

Objectives

To maximize the quality of eggs collected, processed, and delivered to the hatchery.

To provide an environment that minimizes stresses to which the embryo is exposed.

To optimize the potential for each egg to produce a quality day old poult.

Nest Management

- Implement a **weekly** program for maintaining hygiene of bedding and pads.
- Promptly remove broken eggs and fecal material from nests.
- Manage pen litter to minimize moisture and reduce the amount of bacteria tracked into the nests.

Floor Eggs

- Minimize the incidence of eggs laid on the floor:
  - > Train hens to the nest
  - > Eliminate pen corners and dark areas
- Only collect warm and clean floor eggs. **DO NOT** attempt to clean dirty contaminated eggs.

Pre-sanitizing handling

- Initially hand clean and grade eggs in the house.
- **DO NOT** use abrasive materials or tools to clean eggs.
- Separate cracked, dirty, and misshapen eggs from those to be sanitized.
- Remove organic material from eggs to minimize amount introduced into the egg room.
- Transport eggs to the egg room as soon after collection as possible to minimize cooling prior to sanitizing.

Egg sanitizing (Dirty area)

- Minimize amount of organic material introduced to any egg sanitizing system.
- Water-type egg sanitizing systems require monitoring and recording of water temperature, disinfectant levels, and equipment cleanliness. Failure to properly control these factors can severely impact egg and poult quality.
- Follow manufacturers' recommendations for operation and maintenance of your egg sanitizing system.

Egg holding (Clean area)

- After sanitizing, handle eggs with clean, sanitized hands or rubber gloves.
- Minimize personnel movement into the egg holding room.
- If boxing eggs, allow eggs to fully dry and cool prior to putting in closed cases.
- Target an egg holding temperature of 55º to 60ºF (12º to 16°C) consistently throughout the operation. (**See Table 5**)
- Target an egg holding humidity minimum of 70%. (**See Table 5**)
- Monitor and record temperature and humidity in the egg holding area daily.
- Implement a program for weekly cleaning, disinfecting, and monitoring for molds and bacteria in the egg holding area.
- Once eggs have cooled to holding room temperatures, avoid warming and subsequent "sweating" of eggs which could increase the incidence of contamination.

SECTION X. VACCINATION PROGRAMS

Objective

To induce immunity against known disease agents, thus reducing the impact of a field disease challenge on the economic performance of the flock.

Factors to consider prior to vaccinating

- Vaccination is the "second-line" of defense against disease; the first-line is farm biosecurity.
- Base the decision to vaccinate on the prevalence of a disease agent in the area and the risk of exposure.
- "Flock immunity" is relative rather than absolute, i.e., vaccination may not induce 100% protection, but it can greatly reduce the severity of a field challenge.
- Avoid introducing a live vaccine into areas where a particular disease is not known to occur and only after seeking veterinary advice.
- As a general rule, the benefits of any vaccination must be seen to outweigh the cost of vaccination and negative impact of a field challenge on economic performance of the flock.

Designing a vaccination program

- Type of vaccine to use:
  - > The disease agent in the vaccine must be of the same (or closely related) serotype as the field disease agent.
  - > Consider whether a killed or live vaccine is most appropriate.
  - > Use only good quality vaccines from a reputable manufacturer.

- Determine the age of first vaccination, the number of subsequent vaccinations, and the interval between vaccinations by:
  - > The presence of maternal antibodies.
  - > The age at which the birds are susceptible, or most susceptible, to a particular disease agent.
  - > The virulence (severity) of the disease agent in the area.
  - > The need to provide the progeny with a protective level of maternal antibodies
- The method of administration will be determined by:
  - > Type of vaccine (live or killed).
  - > Labor requirement/availability.
  - > The route of vaccination that induces a protective level of immunity.
- Vaccination technique must be properly established and confirmed. Train personnel and develop formalized and standardized procedures for:
  - > Flock management and bird handling to minimize stress prior to, during, and following vaccination.
  - > Proper storage, mixing, and handling of vaccines.
  - > Proper administration technique.
  - > Maintenance of vaccination equipment.
  - > Record keeping to confirm vaccine quality and vaccination technique
  - > Always follow the vaccine manufacturer's recommendations

Why vaccinations sometimes don't work

- Failure to administer the required dose of the vaccine:
- Errors in vaccination technique (most common).
- Improper vaccine handling during transport or storage.
- Poor vaccine quality (rare).
- High levels of maternal antibodies, which neutralize the antigen in the vaccine, thus interfering with the immune response.

- Immunosuppression (inability of the bird to mount a good immune response) at the time of vaccination.
- Strong field challenge that overwhelms the immunity of the bird.
- Infection by a serotype or variant of the disease agent that is not contained in the vaccine.
- Pre-existing infection in the flock at the time of vaccination.
- Waning of immunity as a result of an excessive period of time after vaccination.
- Water sanitizers not properly removed/neutralized from water lines before vaccine administered

All vaccination programs should be periodically monitored and evaluated.

SECTION XI.
CLEANING AND DISINFECTION

Objectives

To keep the farm and the turkeys free of disease and other pathogens.

To properly clean and disinfect the house to reduce health risk and break disease cycles.

Procedures

- Clean and disinfect waterlines. (See **Water**)
  Note – Manufacturer's recommendations should be used with all sanitizers.
- Remove all equipment (drinkers, feeders, nests, panels, AI shoots, etc.) from the house to clean and sanitize separately from the house wash down and disinfection process.
- Empty feed hoppers and bins.
- Remove all litter and debris from house.
- Dry clean house using backpack blower or broom paying special attention to screens, fan housing, vents, and louvers.
- Scrape or sweep down to bare floor.
- Wash house with water and a detergent product using a pressure washer.
- After house is dry, disinfect using an approved disinfectant. Spray to the point of run-off.
- Treat for insects, e.g., flies, darkling beetles, etc., as required. Rotate insecticide products to avoid building resistance to a particular insecticide.
- Bring shavings into the house once it is thoroughly dry. *Applying shavings to a wet floor can promote the growth of mold.*
- Bring all cleaned and disinfected equipment back into house.

- **DO NOT** enter clean house without proper biosecurity procedures. Keep doors closed and locked to keep unauthorized visitors and animals from entering house.
- Bait for rats and mice. Rotate types of baits used quarterly.
- Keep vegetation growth next to house to a minimum.

Water

Note – Manufacturer's recommendations should be used with all sanitizers.

- Flush water lines after birds are removed from house and before litter cleanout.
- Prepare 100 gallons of a 3% cleaning solution. If houses are longer than 500 feet, additional solution may be required.
  - > Mix 3 gallons of a hydrogen peroxide product (Proxy Clean, Pro Clean or 35% hydrogen peroxide) into 97 gallons of water.
  - > For houses with no holding tanks, prepare cleaning solution in a 100 gallon stock tank or barrel. Use a submersible 1/4 horsepower pump to pump solution to the lines.
- Fill water lines with solution.
- Trigger nipple drinkers so the solution saturates the nipple mechanisms.
- Let stand in lines for 24 hours or longer if time permits.
- Flush solution from lines with clean water.
- Remove mineral build-up, if required (see below)
- Start birds on water with 3-5 ppm free chlorine residual at drinker furthest from the proportioner. If using an Oxidation Reduction Potential (ORP) meter, the reading should be a minimum of 650.
  - > Use 4 ounces of 5% bleach per gallon of stock solution proportioned at 1 ounce per gallon of drinking water.
  - > Increase up to 6 ounces of bleach if required to achieve the 3-5 ppm.

Removing Mineral Build-up

- Clean water lines as outlined above.
- Fill lines with a solution of citric acid and let stand in lines for 24 hours.
  - > Mix 4 packs of citric acid per gallon of water (Use up to 6 packs of citric acid if scale is a serious problem).
- Flush the citric acid with a bleach solution.
  - > Prepare a bleach solution of 8-12 ounces of 5% bleach per gallon of water.
  - > Ensure the medicator is pumping in bleach solution as the acid is flushed from the lines.
  - > Leave bleach solution in lines for 4 hours.
- Flush bleach solution from lines with clean water.
- Start birds on water with 3-5 ppm free chlorine residual at drinker furthest from the proportioner. (Mix as defined above.) If using an Oxidation Reduction Potential (ORP) meter, the reading should be a minimum of 650.

DO NOT Mix Chlorine and Acids in the Same Stock Solution

Table 1

Target Environment Temperatures for Nicholas Parent Stock

AGE WEEKS	Sex	TARGET* ºF	ºC
1	M+F	82	28
2	M+F	80	27
3	M+F	78	26
4	M+F	76	24
5	M+F	74	23
6	M+F	72	22
7	M+F	70	21
8	M+F	68	20
9	M+F	66	19
10	M+F	64	18

*Target = Temperature at which fan thermostats should be set to maintain.

MAXIMUM**		MINIMUM***	
ºF	ºC	ºF	ºC
86	30	78	26
84	29	76	24
82	28	74	23
80	27	72	22
78	26	70	21
76	24	68	20
74	23	66	19
72	22	64	18
70	21	62	17
68	20	60	16

**Maximum = Temperature above which all available fans should be “ON.”

***Minimum = Temperature below which supplemental heat should be provided.

ALL TEMPERATURES MEASURED 4 inches (10cm) ABOVE FLOOR IN CENTER OF HOUSE

Table 2

Suggested Light Schedule for Breeder Hens

Period	Open Housing & Light Controlled	Min. Intensity
Hatch to 16-18 weeks	Provide hens with a minimum of 14 hours of continuous light.	8-10 foot candle 80-100 lux
	Natural daylight is preferable; however, if the natural day length is less than 14 hours, add artificial light.	
	If the hens are being grown in a windowless house, give 14 hours of artificial light.	
16-18 weeks to 29 weeks	Reduce the hours of light the hens receive from 14 hours a day to a maximum of 6 hours a day.	8-10 foot candle 80-100 lux
	The purpose of the darkening period is to control or synchronize sexual development of the hens.	
	During this stage, the hens should be in a light-proof house so that when the lights are out the house is **totally dark.**	
29 weeks to market	Return to 14 hours of continuous light.	10-12 foot candle 100-120 lux
	Again, natural daylight is preferable; however, if the day length is less than 14 hours, add artificial light in the morning.	
	If the hens are laying in a windowless house, give 14 hours of artificial light.	
	The day length should never be decreased during the laying period.	

Table 3

Suggested Light Schedule for Control Fed Breeder Toms

Period	Open Housing*	Light Controlled Housing	Min. Intensity
Hatch to Selection (16-18 weeks)	Natural Daylight	10L:140	10 foot candle 100 lux
16-18 weeks to end of production	Artificial light to maintain at least 14L:10D	A constant 12L:12D**	10 foot candle 100 lux
	OR the longest natural daylength between selection and the end of production.	**OR** the gradual increase to a maximum daylight of 16L:8D by the end of production.	
		If the toms appear to be behind in development, increase lights by one hour.	

Lights should not be decreased at any time in daylength at intensity.

*Artificial light provided must be at least 10 foot candle (100 lux).

** When moving toms from open housing to light controlled housing, the artificial daylight must be equal to or longer than the ambient daylight.

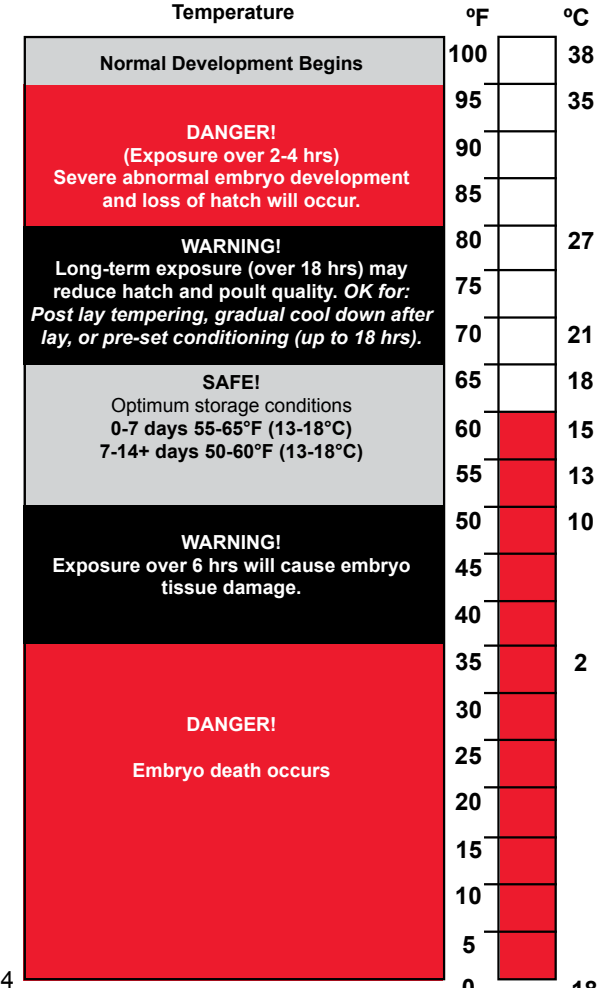
Table 4

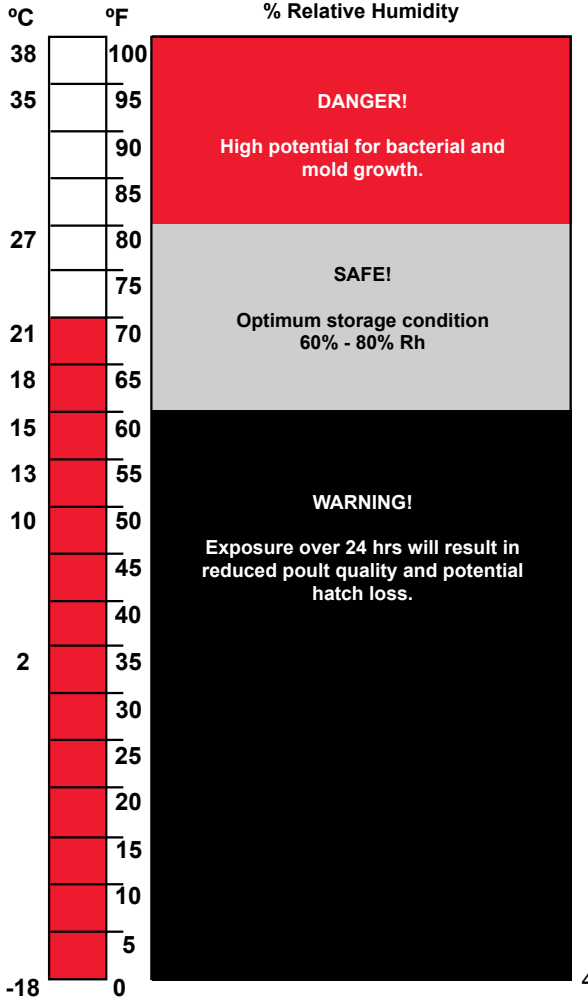
Recommended Semen Dosage

Week of Production	Minimum Live Viable Cells Required (Millions)
0-2	360
3-10	320
11-16	345
17-22	370
23-28	395

Table 5

Hatching Egg Storage Room Recommended Temperature and Relative Humidity




°C
°F
% Relative Humidity
38
35
27
21
18
15
13
10
2
-18
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
DANGER!
High potential for bacterial and mold growth.
SAFE!
Optimum storage condition
60% - 80% Rh
WARNING!
Exposure over 24 hrs will result in reduced poult quality and potential hatch loss.

An Aviagen Group Company

31186 Midland Trail East
Lewisburg, WV 24901 • USA
www.nicholas-turkey.com