An Aviagen Brand

PARENT STOCK

Pocket Guide

2024

Production

20 weeks to depletion

The Pocket Guide

This Pocket Guide was produced to compliment the Arbor Acres® Parent Stock Management Handbook. It should be used for quick and practical reference.

This Pocket Guide is not intended to provide definitive information on every aspect of flock management, but draws attention to important features which, if overlooked, may depress performance.

Performance

This Pocket Guide summarizes best practice management for parent stock that receive first light stimulation after 21 weeks (147 days) of age and achieve 5% production at 25 weeks (175 days) of age. However, poultry production is a global activity and across the world, differing management strategies may need to be adapted for local conditions.

The information within this Pocket Guide cannot wholly protect against performance variations which may occur for a wide variety of reasons. The management techniques covered are considered to be the most appropriate to achieve good performance, consistent with maintaining the health and welfare of the bird.

For further information on the management of Arbor Acres parent stock, please contact your local Arbor Acres representative or visit the website at **www.aviagen.com**.

Contents

Key Management Timetable **5**

Stockmanship **7**

SECTION 1: MANAGEMENT INTO LAY
(20 WEEKS TO PEAK PRODUCTION)

From 140 Days (20 Weeks to Light Stimulation) **11**

Separate-Sex Feeding Equipment **18**

Assessment of Bird Condition **21**

Lighting **28**

Management of Females Post
Light Stimulation until 5% Production **32**

Management of Males from Post
Light Stimulation until Peak Egg Production **38**

SECTION 2: MANAGEMENT INTO LAY
(PEAK TO DEPLETION)

Management of Males after
Peak Production through to Depletion **42**

Management of Females after
Peak Production through to Depletion **45**

Contents

SECTION 3: CARE OF HATCHING EGGS ON FARM

Egg Quality **49**

Best Practice for the Care of Hatching Eggs **50**

SECTION 4: VENTILATION

Ventilation **58**

SECTION 5: NUTRITION

Nutrition **77**

SECTION 6: HEALTH AND BIOSECURITY

Health and Biosecurity **83**

Health Management **89**

Key Management Timetable

Age	Action
20 weeks	Calculate and record the uniformity (CV%) and evaluate the sexual maturity of the flock to determine the lighting program. If a flock has a CV ≤ 8% (uniformity ≥ 79%), follow the normal recommended lighting program. If the flock is uneven (CV > 8%, or uniformity < 79%), light stimulation should be delayed by 1-2 weeks (7-14 days).
21-23 weeks	First light increase given (not before 21 weeks [147 days] of age). Monitor and record body weight and uniformity weekly. Ensure 85-90% of females reach pin-bone space around 2-2.5 fingers (3.8-4.2 cm / 1.5-1.7 in).
21-24 weeks	Mating-up: the exact time will depend on the relative maturity of both males and females. Immature males should never be mated with mature females. If males are more mature than females, they should be introduced gradually. Monitor and record body weight weekly.
24-25 weeks	Introduce the breeder feed from 5% hen-day production.

Age	Action
23-28 weeks	From first egg, increase feed amounts according to the rate of daily egg production, daily egg weight and body weight. Monitor and record body weight weekly.
30 weeks-depletion	Manage males by observing bird condition. Remove non-working males to maintain appropriate mating ratios. Monitor and record body weight.
35 weeks-depletion	Female post-peak feed reduction should be started approximately 5 weeks (35 days) after peak production is achieved, which is generally at 36 weeks (252 days) of age. Feed intake should be reviewed weekly and any reductions in feed should be based on feed clean-up time, egg production, daily egg weight, egg mass and body weight.

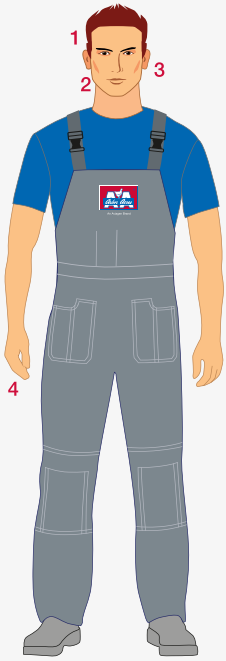
BIRD HANDLING

Animal welfare and safety are of utmost importance at all times. It is critical that people handling birds are experienced and trained in the correct techniques that are appropriate for the purpose, age and sex of the bird.

Stockmanship

Stockmanship is a continuous process that uses all of the stockman's senses to monitor the flock.

Stockmanship – using the senses to monitor the flock.



1 Sight

Observe behaviors such as bird distribution in the house and number of birds feeding, drinking, preening, mating and using nest boxes. Observe the environment, such as dust in the air and litter quality. Observe bird health and demeanor, such as posture, alertness, eyes and gait.

2 Smell

Keep notice of smells in the environment, such as ammonia levels. Is the air stale or stuffy?

3 Hearing

Listen to the birds' vocalization, breathing and respiratory sounds. Listen to the mechanical sounds of fan bearings and feed augers.

4 Feel

Handle the birds to assess crop fill and check the birds' general condition (breast conformation, vent and feather condition). Take notice of air movement across your skin. Is there a draft? What does the temperature of the house feel like?

These observations will help build a picture for each individual flock / house.

Remember, no two flocks or houses are the same!

- Compare this "stock sense" information with actual farm records – are the birds on target?
- Investigate irregularities and develop an action plan to address issues.

The Relationship between Stockmanship and Bird Welfare

Stock sense, combined with the stockman's knowledge, experience and skills in husbandry will produce a rounded technician who will also have personal qualities such as patience, dedication and empathy when working with the birds. The implementation of the "Three Essentials of Stockmanship" will not only bring the birds as close as possible to the ideal state of "The Five Freedoms of Animal Welfare", it will ensure efficiency and profitability.

The Three Essentials of Stockmanship include:

- Knowledge of animal husbandry.
- Skills in animal husbandry.
- Personal qualities.

SECTION 1

Management into lay (20 weeks to peak production)

Objectives

- To minimize variation in the onset of sexual maturity of the flock and to prepare the flock for the physiological demands of reproduction.
- To bring the female into lay by stimulating and supporting egg production using feed and light.
- To promote and support female reproductive performance throughout the laying cycle.

From 140 Days (20 Weeks to Light Stimulation) **11**
Separate-Sex Feeding Equipment **18**
Assessment of Bird Condition **21**
Lighting **28**
Management of Females Post Light Stimulation until 5% Production **32**
Management of Males from Post Light Stimulation until Peak Egg Production **38**

From 140 Days (20 Weeks to Light Stimulation)

Management Considerations

Recommended stocking densities from 20 weeks of age.

Stocking density (birds / m² [ft² / bird])

	20 weeks to depletion
Male Female	3.5-5.5 (2.0-3.1)

Recommended feeder and drinker space from 20 weeks of age.

Feeder

	Age	Track cm (in)	Pan cm (in)
Male	20 weeks to depletion	20 (8)	13 (5)
Female		15 (6)	10 (4)

Drinker

	Bell cm (in)	Nipple (birds per nipple)	Cups (birds per cup)
Male Female	2.5 (1.0)	6-10	15-20

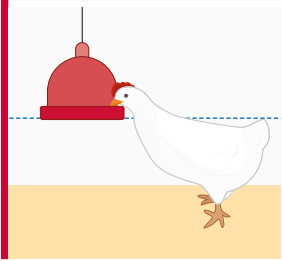
Birds should have continual access to fresh, clean, drinkable water.

Regular cleaning is required to ensure the hygiene of open-sourced drinkers.

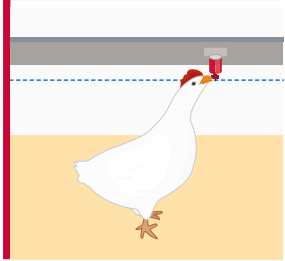
The measurement of water consumption by metering is an essential daily management practice.

Check and adjust drinker height daily.

Correct height of bell drinker.



Correct height of nipple drinker.



Nest Box Set-up:

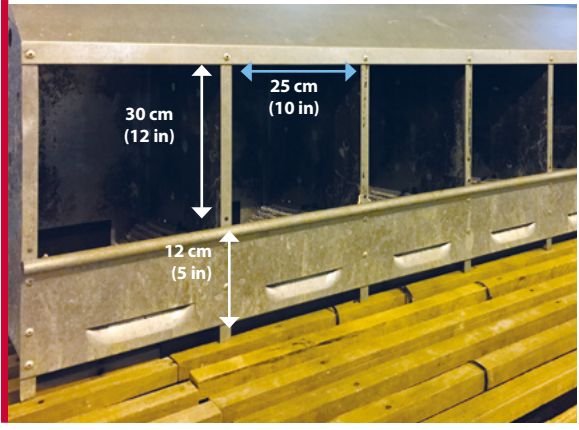
Nest boxes must be set up prior to the onset of lay.

The entrance to the nest must be large enough for the hen to enter, turn around and exit comfortably.

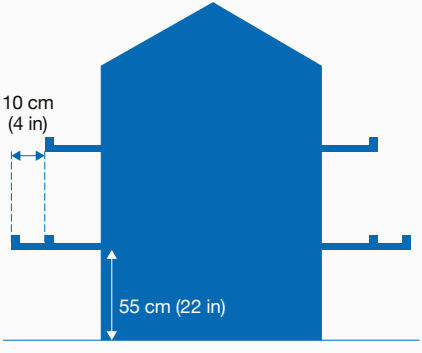
Nests must have a firm entrance and a solid base and be securely fixed in place.

For manual nest boxes, the lower alighting rail should be no more than 55 cm (22 in) from the floor and it should extend to a minimum of 10 cm (4 in) beyond the rail of the second tier.

Nest box entrance dimensions.



Manual nest box set-up.



Rear and Move Facilities

Transfer should never be completed before 18 weeks (126 days) of age or after 23 weeks (161 days) of age.

For light proof laying facilities transfer should not occur later than 21 weeks (147 days) of age.

For open-sided laying facilities transfer may need to be later than 21 weeks (147 days) depending on the season.

Transfer males at least 24 hours before the females to allow them to find feeders and drinkers.

An additional increase in feed quantity (up to 50%) on the day before and the day of transfer will help compensate for any moving challenges.

Do not feed birds on the morning they are due to be moved. It is good practice that feeders in the laying facility be fully charged to minimize the noise and bird disturbance caused by the equipment.

Return feed levels to normal on the first or possibly the second day after transfer.

Assess crop fill after transfer to ensure all birds have found feed and water. Check 50 males and 50 females 30 minutes and 24 hours after their first feed.

Minimize environmental and equipment differences between rear and lay facilities.

Day-old to Depletion Facilities

If the feeding system is changed between rear and lay, transferring birds to the new feeding system must be managed carefully.

Check crop fill to determine that all birds have found the new feeders and drinkers, and are managing to access feed.

Mating-up

Mating-up should only occur when males and females are sexually synchronized and not before 18 weeks (126 days).

A mature male / female will have a well-developed comb and wattles that are red in color.

Where variation exists in sexual maturity within the male population and some males are visibly immature, the more mature males should be mixed with the females first.

For example, mix half of the total number of required males (those that are most mature) at 21 weeks (147 days). Mix a further quarter (again the most mature males) a week later, and then finally mix the remaining males the following week.

Mating-up should be postponed by 1-2 weeks (7-14 days) if sexual maturity is delayed, or when moving from dark-out rear to open-sided lay facilities.

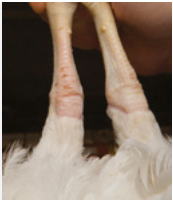
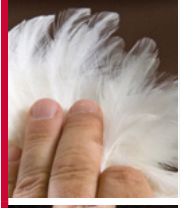
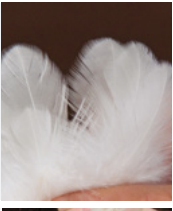
An example of a sexually mature male (on the left) and an immature male (on the right).

An example of a sexually mature female (on the left) and an immature female (on the right).

Sexing Errors

It is good practice to remove sexing errors whenever they are identified during the life of the flock. Ideally, all sexing errors should be removed before mating-up.

Criteria for identifying males and females for the resolution of sexing errors.

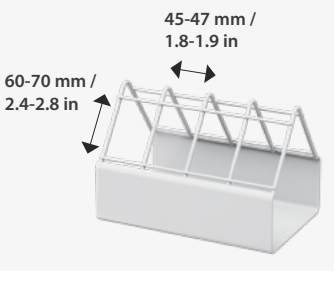
Male		Female
	**Comb and Wattles** 15 weeks (105 days) More developed and redder in males.	
	**Hock Joints** 20 weeks (140 days) Thicker and broader in males. Narrower and smoother in females	
	**Feathering Around the Neck** 20 weeks (140 days) Long-fringed, spear-shaped feathers in males. Denser, paddle-shaped feathers in females.	
	**Body Shape** 20 weeks (140 days) Males longer and narrower. Females more compact and broader around pelvis.	

Separate-Sex Feeding Equipment

After transfer, feed males and females from separate feeding systems.

- Female track feeding systems should have grills fitted to prevent male access.
- The addition of a plastic pipe in the apex of the grill can be used to further restrict male access.
- Male feeders must be raised to a height that will allow only males to access them.
- Observe feeding behavior daily to ensure both sexes are feeding separately, male and female feeders are at the correct height and feeding space and feed distribution are adequate.
- Make daily checks for damage, displacement or irregularity of gaps in the female feeder system and feed spillage.
- Check crop fill regularly.

Separate-sex female feeding system showing grills (grids or toast racks).



Male feeders (from top to bottom: automatic pan feeders, hanging hoppers, suspended feeder track).

Weighing birds in production

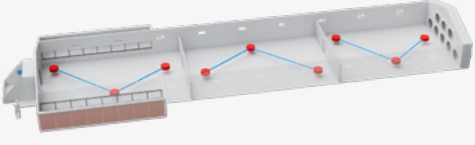
Birds should be weighed at least weekly after transfer to the production facility.

PROCEDURE

Individual Weighing from 20 Weeks

1. **Suspend the scales in a secure place in the weighing pen, and ensure that they are set to "zero" with a shackle for holding birds firmly attached.**
2. **Using a catching pen, sample at least 2%, or 50 birds per population, whichever is greater. Male sample size should be increased to 10% after mating-up.**
3. **Birds should be sampled from at least 3 points within the house, away from doors and walls.**
4. **Calmly and correctly handle each bird, place it on the shackles, wait until it is still, and record the weight from the scale.**
5. **Release the bird back into the main pen population and repeat the process until all birds caught have been weighed.**

Example of the correct bird sampling points within a house.



Assessment of Bird Condition

Handle a representative sample of both males and females weekly during weighing from 20 weeks to determine overall flock condition.

It is good practice to catch and physically assess individual birds while doing a house "walk-through" (20-30 females and 15 males should be selected at random).

Be aware of the degree of fleshing, general health, alertness and activity.

MANAGEMENT FUNDAMENTAL

Regular assessments of male and female physical condition (fleshing) should be made throughout the life of the flock.

Assessing Body Condition (Breast Shape or Fleshing)

PROCEDURE

Assessing Body Condition (Fleshing)

1. **Randomly select 20-30 females or 15 males while walking through the house.**
2. **While holding the bird by both legs, run your hand over the keel bone.**
3. **Assess the prominence of the keel bone, and the amount, shape and firmness of the breast bone, on either side of the keel bone.**
4. **The breast should be firm and rounded to the touch.**

Record condition scores and calculate the flock average. Monitor the trend over time.

Determine appropriate management and feeding strategies using body condition in conjunction with body weight and uniformity.

Ideally, the same person should score the birds each week.

Monitoring Body Condition in Males

Male fleshing scores.

1 Sunken V

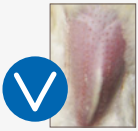
Should not be seen within the flock.

Male is emaciated, keel bone is prominent, practically no flesh to measure.

2 Standard V

20-30 weeks of age.

Keel bone is prominent, but male is carrying some fleshing.



3 Standard U

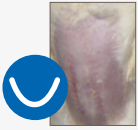
30-50 weeks of age.

Chest is getting wider, but still a U shape, practically no keel bone left to be felt.

4 Wide U

>50 weeks of age.

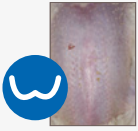
Chest is getting wider, but still a U shape, practically no keel bone left to be felt.



5 Dimpled U

Should not be seen within the flock.

So grossly over-fleshed that the breast dimples, sinking back to the keel.



Example of firmness testing.

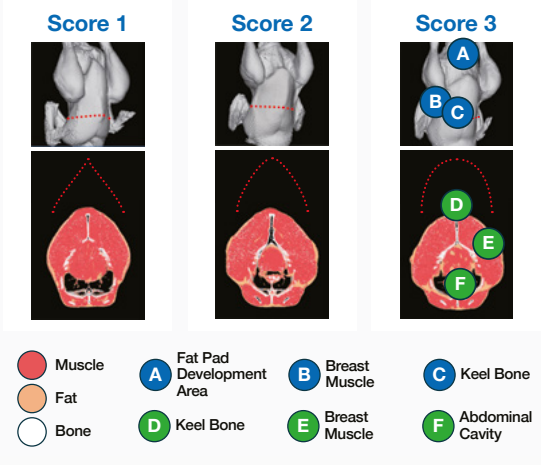
Very Firm	
Firm	
Medium-Firm	
Soft	

In addition to the amount of breast fleshing, the firmness of the breast muscle needs to be considered. For the period between 28 and 35 weeks of age (just past flock peak) the muscle tone should be firm. Firmness tests are often used to help determine breast muscle firmness.

Monitoring Body Condition in Females

Different to that used for males, a score of 1-3 is used for a female scoring system.

CT scanner images illustrating the fleshing scoring system for assessing female body condition.*



* These pictures show 40-week-old females. The top 3 images show the whole bird (the dotted lines indicate the position at which the cross-section images were taken). The bottom 3 images show an internal cross section view of the breast. In lay, it is preferable that the average flock score is between 2.0 to 2.5.

Pin-Bone Spacing

PROCEDURE
Monitoring Pin-Bone Spacing
1. Monitor pin-bone spacing regularly from 15-16 weeks (105-112 days) of age up to point of lay.
2. Monitor every time the house is "walked" but as a minimum, once per week during weighing.
3. Ideally, the same person should measure pin-bone spacing from week to week to ensure accurate and consistent measurement and allow for differences in hand size.
4. Select females randomly during the monitoring process and handle with care.
5. Hold the female in one hand and measure spacing by placing your fingers between the pin (pelvic) bones, measuring the distance between them.
6. As a general rule, birds are at the point of lay when the distance between the pin-bones is about 3 fingers (approximately 5-6 cm or 2.0-2.4 in).

Expected changes in pin-bone spacing with age.

Changes in pin-bone spacing with age.*

Age	Pin-Bone Spacing	Approximate Distance Between Pin-Bones
84-91 days	Closed	-
119 days	1 finger	1.9-2.5 cm (0.75 in-1 in)
21 days before first egg	1½ fingers	
10 days before first egg	2-2½ fingers	3.8-4.2 cm (1.5 in-1.7 in)
Point of lay	3 fingers	5-6 cm (2-2.4 in)

* If pin-bone spacing does not develop as expected, i.e., is below 1.5 fingers at planned first light stimulation, or if there is a big variation in pin-bone spacing between individuals, then light stimulation should be delayed.

Lighting

Daylength increases from rearing to laying (controlled-environment housing).

Age (days)	Age (weeks)	Daylength (hours) for flocks with different CV% or uniformity at 20 weeks (140 days)		Lighting Intensity
		CV% ≤ 8 or uniformity ≥ **79%**	CV% > 8 or uniformity < **79%**	
140-146		8	8	10-20 lux (1-2 fc)
147	21	11	8	
154	22	12	12	
161	23	13	13	30-60 lux (3-6 fc)
168	24	13	13	
175-depletion	25-depletion	13	13	

The maximum response to the pre-lay increase in daylength is only obtained by achieving the correct body-weight profile during rear, good flock uniformity and the appropriate nutritional input.

During lay, there is no advantage in exceeding 13-14 hours of light per day at any stage (where light proofing is good, there is no need to exceed 13 hours).

Where birds are kept in open-sided housing during lay, and the longest natural daylength exceeds 14 hours, the combined artificial and natural lighting should be extended beyond 14 hours to equal the longest natural daylength.

Late Light Stimulation

In environmentally controlled housing where the photoperiod does not exceed 14 hours, adding 2 hours post 50-weeks can have the effect of late flock light stimulation. In trials and field examples this has shown a positive improvement in egg production when a small temporary feed increase accompanies the increase in day length.

Flicker

Compared to humans, birds have a high flicker fusion rate (the frequency at which it can no longer be perceived) which creates the ability to see fast-moving objects. This aspect of a bird's vision is important when considering lighting because birds will be able to detect flicker (a visible change in brightness) when humans do not. Flicker leads to bird distress, which will eventually lead to decreasing animal welfare and performance.

Uniformity of Light Intensity

Light must be uniformly distributed throughout the house. Frequent changes in contrast between high and low light intensity causes eye discomfort. It can also encourage management issues such as floor eggs. Lights should be evenly distributed throughout the house and be equidistant from the house floor. Reflectors placed on top of the lights can help to improve light distribution. Lights must be kept in good working order.

Lamp types

There are no data to show that one type of lamp induces better performance than any other, and so lamp choice will depend on availability, capital outlay, running costs, and the ability to dim using conventional voltage-reduction equipment.

Advantages and disadvantages of different lamp types.

Lamp Type	Advantages	Disadvantages
Incandescent	Good spectral range. Can be used with dimmer. Inexpensive.	Inefficient. Lasts 700-1,000 hrs. ~15 lumens / watt (tungsten). 25 lumens / watt (halogen). High energy cost.
Fluorescent / Compact Fluorescent	More efficient than incandescent. Use less power. Last longer. Reduce electricity cost compared to incandescent. Relatively inexpensive but more expensive than incandescent.	Difficult to dispose of (contain mercury). Can't be used with dimmer. Loses intensity over time. Issues with flicker. Does not reach maximum intensity immediately when turned on.
Sodium Vapor	Energy efficient. Long life span Consistent color temperature (warm).	Sodium is hazardous. Warm up time is required (5-15 mins). Require a ballast.

Advantages and disadvantages of different lamp types.

Lamp Type	Advantages	Disadvantages
LED	Energy efficient. 200 lumen / watt. Last up to 50,000 hrs. Specific lighting colors can be chosen. Some can be used with a dimmer.	High initial cost. Cheaper lights will not have suitable light spectrum or be suitable for the environment in the poultry house. Flicker can be a problem if not installed correctly.
Halogen	Luminous efficiency. Stable color temperature. Almost no light decay. More efficient than incandescent.	Not ideally suited to dusty environments. Less efficient than LED and fluorescent lamps. More expensive than incandescent lamps. Emits a lot of heat.

Measuring Light

The light meter needs to be appropriate for the lamp type. For example, not all agricultural light meters are accurate for light emitting diode (LED) lights.

Management of Females Post Light Stimulation until 5% Production

Management Considerations
Achieve target body weight by concentrating on correct weekly feed increases and resultant body weight gains.
Follow the recommended lighting program.
Monitor flock uniformity, body weight, pin-bone spacing and feed clean-up time, and respond quickly to any deviations from normal.
Provide unlimited access to clean, good-quality drinking water.
Change from pre-breeder to breeder 1 feed at 5% production at the latest.
Open nest boxes just before anticipated arrival of first egg.
Where automatic nest systems are used, run the egg collection belt several times each day before the start of lay so that birds become accustomed to the sound and vibration.

Lay

During lay, the main drivers for decisions on feeding management for females are body weight and egg mass. Regular monitoring of pin-bone spacing, fleshing and fat-pad development can provide useful supportive management information.

Management of Females from 5% Hen-day Production until Peak Egg Production

Management Considerations

Frequency of observation of key production parameters used to assess correct feed allocation.

Parameter	Frequency
Egg production	Daily
Increase in egg production	Daily
Egg weight	Daily
Body weight	Weekly (manual) / Daily (automatic)
Body-weight gain	Weekly (manual) / Daily (automatic)
Feed clean-up time	Daily
House temperature (min. and max.)	Daily
Body condition and fleshing	Weekly (and on walk-through)

Monitoring body weight, egg weight and egg production is key.

Monitor and record both absolute and trend data.

Feed Increases from 5% Production to Peak

- Define a program of feed increases based on feed amount prior to production, dietary energy level, ambient temperature and expected flock productivity.
- Feed increases given should be proportional to actual rates of production in small frequent rises to prevent excessive weight gain.
- The breeder 1 feed should be introduced at 5% hen-day production.
- In high-producing flocks, feed increases beyond recommendations may be required.
- If egg weights and / or body weights are judged to be markedly below expected targets, feed increases should be advanced.

Feed Clean-up Trends

A guide to feed clean-up times.

Feed Clean-up Time at Peak Production (hours)	Feed texture
3-4	Coarse Mash
2-3	Crumble
1-2	Pellet

- Monitor feed clean-up times and trends in feed clean-up times.
- Respond to any changes in feed clean-up trends.

Egg Weight

Trends in daily egg weight act as a sensitive indicator of the adequacy of total nutrient intake; inadequate nutrient intake will lead to a decrease in egg weight, and excessive nutrient intake will lead to an increase in egg weight. Feed intake should be adjusted according to deviations from the expected daily egg weight profile over a 3-4 day period.

PROCEDURE

Weighing Eggs

1. **Record daily egg weight from 10% hen-day production onwards.**
2. **Bulk weigh a sample of 120-150 eggs daily.**
3. **Collect the eggs directly from the second nest collection.**
4. **Remove any double-yolked, small and abnormal eggs (e.g., soft shelled).**
5. **Calculate average daily egg weight by dividing the bulk egg weight (weight of eggs minus weight of tray or trays) by the number of eggs weighed.**
6. **Plot the daily weight against the target.**
7. **If the flock is being underfed, egg size will not increase over a 3-4 day period and egg weight will deviate from the target.**

   If peak feed amount has not been reached then the next planned feed increase should be brought forward.

   If peak feed has been reached then an additional increase in peak feed amount will be required (3-5 g [0.1-0.2 oz]).

Floor Eggs

To help manage and reduce floor egg levels, the following management points may be used:

- Slat height should be a maximum of 25-30 cm (10-12 in).
- Litter depth of 2-4 cm (0.8-1.6 in).
- Allow access to perches from 4 weeks (28 days).
- Incorporate a suitable alighting / perching rail in nest box design.
- Ensure male and female sexual maturity is synchronized.
- Follow the recommended lighting program and ensure that light stimulation is synchronized with body weight.
- Have uniform distribution of light greater than 30-60 lux (3-6 foot candles); avoiding the presence of dark and shaded areas next to walls, corners, and in the areas next to steps and slat fronts.
- Provide correct feeder space for females.
- Keep nest boxes closed until just prior to the anticipated arrival of the first egg.

Example of closed nest boxes. Nest boxes will be opened just prior to the anticipated arrival of the first egg.

When using manual nests place 20% on floor level to start. Thereafter, gradually raise them (over a period of 3-4 weeks) to the normal height.

Run egg collection belts several times each day from transfer where automated systems are used.

Walk around the house as frequently as possible (at least 6 and up to 12 times per day) picking up any floor eggs.

Set feeder and drinker heights appropriately so that they are not obstacles to nest access.

Manage mating ratios to avoid over-mating.

Allow 3.5-4 hens per nest hole for manual nests.

Allow 40 hens per linear meter (12 birds per linear foot) for mechanical (communal type) nests.

Set feeding times to avoid the peak of egg laying activity. Feeding time should be either within 30 minutes of "lights on", or 5-6 hours after "lights on" to prevent birds from feeding when the most eggs are likely to be laid.

MANAGEMENT FUNDAMENTAL

Attention to detail avoids floor eggs.

Management of Males Post Light Stimulation until Peak Egg Production

To maintain fertility throughout lay, non-working males can be progressively removed from the flock as it ages.

A guide to typical mating ratios.

Age (days)	Age (weeks)	Number of Good Quality Males Per 100 Females
154 - 168	22 - 24	9.50 - 10.00
168 - 210	24 - 30	8.50 - 9.50
210 - 245	30 - 35	8.00 - 8.50
245 - 280	35 - 40	7.50 - 8.00
280 - 350	40 - 50	7.00 - 7.50
350 to depletion	50 to depletion	6.50 - 7.00

Males retained for mating should have the following characteristics:

Uniform in body weight.
Free from physical abnormalities (be alert and active).
Correct beak shape.
Strong, straight legs and toes.
Well feathered.
Good upright stance.
Good muscle tone and body condition (fleshing).
Comb, wattles and vent showing evidence of mating activity.
Red, moist vent.

Review mating ratios weekly. Whenever over-mating occurs, surplus males must be removed as quickly as possible.

SECTION 2

Management into Lay (Peak to Depletion)

Objectives

To maximize the number of fertile hatching eggs produced per female, by ensuring persistency of egg production post peak.

Management of Males after Peak Production through to Depletion **42**

Management of Females after Peak Production through to Depletion **45**

Management of Males after Peak Production Through to Depletion

Body Condition

Body condition should be scored at least weekly from peak to depletion.

Using a combination of physical assessments will provide a better indication of bird condition and overall fitness and thus facilitate better management decisions (feed allocation and the implementation of mating ratio reduction plans).

MANAGEMENT FUNDAMENTAL

Regular assessments of male physical condition (fleshing) should be made throughout the life of the flock.

Assessment of Male Condition

Physical assessment of male condition must be comprehensive and include:

Alertness and activity

Good distribution of alert males within the flock.

Legs and feet

The legs should be straight with no bent toes, and the footpads should be free from abrasions.

Head

Males should have a uniform, intense red color around the comb, wattle and eye area. Beaks should be uniform in shape.

Feathering

A good quality male will exhibit some partial feather loss, especially around the shoulders and thighs.

Vent
The vent should show some feather wear, be large and moist, with good (red) coloration.

Body weight
According to target.

Body condition (fleshing)
Shape and softness or hardness of breast muscle tone.

Management of Males after Peak

- Ensure sufficient sample of males are weighed (10% in lay).
- Never decrease male feed allocation.
- Feed increases should account for body weight, fleshing and physical condition, to maintain growth and persistency of fertility.
- Maintain litter quality to promote good footpad health.
- Follow a planned male reduction program.

Management of Females after Peak Production Through to Depletion

General Guidelines for Post-Peak Feed Reduction

Monitoring and control of body weight, condition and egg weight are major priorities post peak.
Follow a feed reduction program that allows the birds to gain weight at a rate of 20 g / week (0.7 oz / week).
Failure to control body weight from peak production will reduce production persistency and affect egg size.
Make weekly feed adjustments based on trends in egg weight and body weight.
Flocks producing at levels above production targets may require more feed. Feed reductions should be of smaller amounts and more gradual.
If a flock peaks poorly, the feed withdrawal should be more rapid to avoid birds becoming overweight.
As ambient temperature changes, review and adjust feed levels to ensure correct energy requirements are achieved.
Poorly feathered hens will have a higher maintenance requirement. This requirement needs to be met to minimize drops in production.

The following characteristics should be measured, recorded and graphed onto a chart:

- Daily (or weekly) body weight and body-weight change relative to target.
- Daily egg weight and egg-weight change relative to target.
- Daily changes in feed clean-up time. Consideration should also be given to feed quality, particle size, bird health, environmental changes and human or equipment errors.

Abdominal Fat Pad

- Assess fat pad routinely (at least weekly) from the start of lay.
- As a guide, maximum fat pad volume should be no more than the size of an average person's cupped hand or a large egg (roughly 8-10 cm [3-4 in]).

Assessing abdominal fat pad in a female broiler breeder.

MANAGEMENT FUNDAMENTAL

Using a combination of physical assessments (body weight, fleshing, fat pad and pin-bone spacing) provides a reliable indication of overall female condition.

SECTION 3

Care of Hatching Eggs on Farm

Objectives

To manage farm egg storage conditions so that there is as little bacterial contamination and age-related deterioration in the blastoderm and egg contents as possible, in order to optimize lifetime hatchability and chick quality.

Egg Quality **49**
Best Practice for the Care of Hatching Eggs **50**

Egg Quality

Examples of good quality hatching eggs.

Good quality nest eggs

Examples of eggs with an increased risk of contamination or lower hatchability.

Slight soiling | **Clean floor egg** | **Clear shell**

Examples of eggs that should be rejected.

Fecal soiling | **Yolk on shell** | **Blood on shell**

Best Practice for the Care of Hatching Eggs

Eggshell Disinfection

Formaldehyde is effective against bacteria, viruses and fungal spores. Its advantages include:

- Protection of the inactive blastoderm.
- Having a residual effect which continues to protect the egg after the initial treatment.

However, formaldehyde is a carcinogen and its application is restricted or prohibited in many countries. A good alternative to formalin is the use of ultra violet (UV) light above the egg collection belt before the eggs are packed. It can:

- Provide a good bacterial kill without damaging the cuticle.
- Associate with slightly improved hatchability.
- Improve the hygiene status of the egg collection belt.

Because of the reduced use of formaldehyde worldwide, alternative hatching egg disinfection chemicals and application methods are often suggested and should meet the following conditions:

- Kills bacteria and fungi, in active and sporulated forms, after a single application, which does not slow down the process of packing the eggs.
- Is safe for humans without the use of personal protective equipment.
- Dispersed in gas form – not dissolved in water.
- Causes no physical damage to the cuticle.
- Allows the farm to treat eggs after each collection, rather than at the end of the day.

Egg Collection

Keep nests and any collection belts free of litter and droppings.

Collect eggs frequently (at least 4 times per day) to:

- Reduce the chances of eggs being cracked and dirty.
- Improve the uniformity of cooling.

Collect final daily eggs as late in the day as possible to minimize the number of eggs held in the nests or belts overnight.

Collect floor eggs separately and frequently (5 or 6 times per day), disinfected as soon as possible and kept separate from nest eggs.

Eggs should be loaded bottom to top so that warm eggs are not rewarming eggs from a previous collection.

Egg Selection and Packing

Egg selection can limit the contamination due to soiling or damaged shell and therefore promote optimal day-old chick quality. Packing should allow eggs to be cooled evenly and moved freely.

PROCEDURE
Egg Selection and Packing
1. Select and pack eggs immediately after each collection.
2. Reject eggs that are small, cracked or damaged, eggs with gross shell abnormalities, double-yolk eggs, soft shelled eggs, and any eggs that are more than 25% covered with dirt or droppings.
3. Record numbers rejected in each category and monitor them.
4. Place packed trays in egg store immediately. Load trolleys from bottom up.
5. If boxing, eggs must be cooled on well separated racks to allow them to cool uniformly before they are packed.
6. Do not wrap eggs or trolleys in plastic unless they have cooled to egg store temperature, and remove the plastic immediately after transport.
7. Do not remove trolleys from the egg store when loading eggs.

Egg Cooling and Storage

Relationship between length of egg storage and temperature of egg store.

Storage Period (days)	Temperature of Storage °C (°F)
1 - 3	18 (64)
1 - 7	15 (59)
> 7	15 (59)
*>15	12 (54)

*For storage over 15 days, 12°C (54°F) can work well, but only if great care is taken to avoid condensation when eggs are moved to a warmer environment.

It is important to coordinate temperatures with those used during transport to and storage at the hatchery. This will avoid fluctuating temperatures and condensation.

Ideally, egg store humidity should be held between 70 and 80% RH to prevent the eggs from losing too much moisture during storage.

Airflow in the egg store should be uniform throughout the room. Do not blow cooler or heater fans towards eggs. Trolleys should be laid out separately; do not block the airflow.

Hygiene of the egg store should be carefully monitored. The cleaning and disinfection procedures should be audited regularly.

Eggs should be cooled before placing on cardboard trays and wrapped.

Load egg trays bottom to top to avoid reheating the eggs above.

Hatching Egg Transport

Eggs can be packed on setter trays and cooled on spaced racks on farm trolleys.

The trolleys can be moved to the egg truck and transported to the hatchery by transport vehicle where road conditions are good.

However, if road conditions are poor, excessive jolting increases the number of hairline cracks in the eggshells, and also increases the number of embryos and chicks presenting developmental abnormalities.

When cold eggs are moved into a warm, humid atmosphere, condensation will form on the egg surface. This can occur when they are transported from a cold egg store on the farm to a warm hatchery.

If eggs are sweating, they should not be fumigated or put into a cold egg store until they are dry.

The lowest temperature to form condensation during egg moving.

Egg Store Temperature °C (°F)	Relative Humidity (%RH) of Room Eggs Moved Into				
	40	**50**	**60**	**70**	**80**
12 (54)	27 (81)	23 (73)	20 (68)	18 (64)	15 (59)
13 (55)	28 (82)	24 (75)	21 (70)	19 (66)	16 (61)
14 (57)	29 (84)	25 (77)	22 (72)	20 (68)	17 (63)
15 (59)	30 (86)	26 (79)	23 (73)	21 (70)	18 (64)
16 (61)	31 (88)	27 (81)	24 (75)	22 (72)	19 (66)
17 (63)	32 (90)	28 (82)	25 (77)	23 (73)	20 (68)
18 (64)	33 (91)	29 (84)	26 (79)	24 (75)	21 (70)

Condensation on the surface of the egg.

SECTION 4

Ventilation

Objectives

To ensure that good welfare and reproductive performance is achieved by maintaining birds under appropriate, and where possible, optimal environmental conditions.

Ventilation **58**

Ventilation

Open-Sided / Natural Ventilation

Natural ventilation requires continuous 24-hour management.

Vary curtain height to achieve optimum airflow.

Curtains should be fastened to the sidewalls at the bottom and be opened from the top down to minimize drafts and wind flowing directly onto birds.

Open curtains on both sides of the house to provide cross-ventilation.

In light wind or wind that changes direction frequently curtains on each side should be opened the same amount.

If the wind is coming consistently from one side of the building, the curtain on the prevailing side should be opened less than the downwind side to minimize drafts.

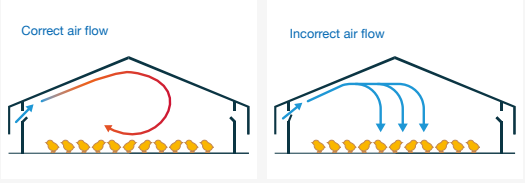
Circulation fans should be used to supplement and enhance temperature control within the house.

In hot weather conditions, several steps can be taken to minimize the impact of high temperatures:

- Reduce stocking densities.
- Ensure adequate roof insulation is in place; spraying water on the roof will help keep it cool (use with caution as this may raise RH levels).
- Use circulation fans.
- Using tunnel ventilation system with evaporative cooling.

Controlled - Environment Housing

Achieve good airflow and volume.



If incoming airflow speed and volume is too low:

- Cold air will drop directly on to the birds / litter.
- Birds become stressed and possibly causing wet litter.

Ensure the house is tightly sealed.

- Ventilation only works effectively if the house is adequately sealed and there are no air leaks.
- This ensures that airflow speed and volume entering the house are controlled and correct.

Uniform air inlet openings.

Open air inlets must be evenly distributed through the house and be opened equally.

This will create uniform:

- Volume of airflow.
- Speed of airflow.
- Direction of airflow.
- Distribution of airflow.

Air inlets must be managed based on the operating fan capacity.

Monitor and evaluate air speed regularly.

Monitor house pressure and air speed:

- For every increase in negative pressure of 3-4 Pa (0.012-0.016 inches of water column) air will travel ~ 1 m (3.3 ft) into the house.
- Incoming air should be thrown into the center of the house.

Use smoke tests or ribbon tape to confirm airflow direction and inlet settings are correct.

Monitor bird behavior.

Complete regular evaluation of:

- Air quality.
- Relative humidity.
- Signs of condensation.
- Dust levels.
- Litter quality.
- Bird behavior.

PROCEDURE

Evaluating Negative Pressure of Controlled-Environment Housing*

1. **Close all doors and inlets in the house.**
2. **Switch on one 127 cm (50 in) fan, or two 91 cm (36 in) fans.**
3. **The pressure in the house should not measure less than 37.5 Pa (0.15 inches of water column).**

*The above is based on a house with ±1,850 m^2 (19,900 ft^2) floor area. For example, 15 m (49 ft) wide x 123 m (404 ft) long. Smaller floor areas should achieve higher test pressure, and larger floor areas may be less. The pressures mentioned in this test are NOT operating pressures. They are only used to determine / indicate how well sealed the house is.

A manometer used to monitor air pressure within the house (the reading given is equivalent to 37.5 Pa / 0.15 inches of water column).

Minimum Ventilation

It is essential to provide some ventilation to the house regardless of the outside conditions.

Minimum ventilation is used when the house temperature is below the house set point temperature (bird comfort temperature), or within 2°C (3.6°F) above the set point (dependent on the age of the birds).

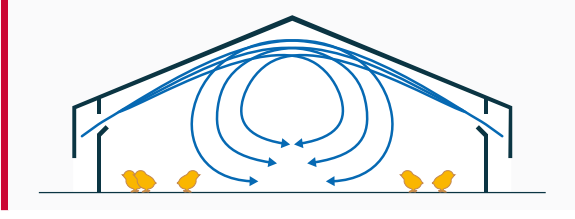
Extraction fans operating on a cycle timer (on / off) draw air into the house through sidewall or ceiling air inlets.

It is recommended that a 5 minute cycle timer (ON + OFF time = 5 minutes) is used.

Air inlets should be opened at least 3-5 cm (1.2-2.0 in) for the airflow into the house to be effective.

Accurate ventilation settings for the house can be determined by carrying out smoke tests. Alternatively, ribbon tape can be hung from the ceiling every 1-1.5 m (3-5 ft) in front of an air inlet up to the apex of the house.

Correct airflow during minimum ventilation.



MANAGEMENT FUNDAMENTAL

Monitor airflow, bird distribution and bird behavior to determine if settings are correct.

Minimum Ventilation Rates

Minimum ventilation requirements are shown below.

During minimum ventilation, the actual air speed at floor level should be no more than 0.15 m / sec (30 ft / min).

Maximum levels of RH, carbon monoxide, carbon dioxide and ammonia should never be exceeded (See the table in the Air Quality section on page 68).

Approximate minimum ventilation rates (per bird) for temperatures between -1 and 16°C (30 and 61°F).

Average Weight kg (lb)	Ventilation Rate* m^3 / hr (ft^3 / hr)
2.20 (4.85)	1.56 (0.92)
2.40 (5.29)	1.67 (0.98)
2.60 (5.73)	1.77 (1.04)
2.80 (6.17)	1.87 (1.10)
3.00 (6.62)	1.97 (1.16)
3.20 (7.06)	2.07 (1.22)
3.40 (7.50)	2.16 (1.27)
3.60 (7.94)	2.26 (1.33)
3.80 (8.38)	2.35 (1.39)
4.00 (8.82)	2.44 (1.44)
4.20 (9.26)	2.53 (1.49)
4.40 (9.70)	2.62 (1.55)
4.60 (10.14)	2.71 (1.60)
4.80 (10.58)	2.80 (1.65)
5.00 (11.03)	2.89 (1.70)

*This table should only be used as a guideline, as actual rates may need to be adjusted to environmental conditions, bird behavior, and bird biomass(total bird weight in the house).

Air Quality

The main contaminants of air within the house environment are dust, ammonia, carbon dioxide, carbon monoxide, excess water vapor, and levels of these contaminants must be kept within legal limits at all times.

During the first 30 to 60 seconds of entering the house ask the following questions:

1. Does it feel stuffy?
2. Is the air quality acceptable?
3. Is humidity too high or too low?
4. Does it feel too cool or too warm in the house?

PROCEDURE

Calculating Minimum Ventilation Requirement

1. **Determine the average body weight of birds in the house.**
2. **Select the appropriate ventilation rate for average body weight in the house.**
3. **Calculate the minimum ventilation requirement**

Minimum ventilation requirement per bird (m^3 / hr or ft^3 / min)	x	Number of birds in the house	=	Appropriate minimum house ventilation requirement.

Employ the following steps to determine the interval fan timer settings for minimum ventilation.

PROCEDURE

Calculating Cycle Timer Settings

1. **Calculate the minimum ventilation requirement (m^3 / hr or ft^3 / min).**
2. **Calculate the percentage time the fans need to be running.**

$$\text{Percentage of time (\%)} = \frac{\text{Minimum ventilation requirement}}{\text{Total capacity of fans being used}} \times 100$$

Air

Effects of common parent stock house air contaminants.

Ammonia	Ideal level <10 ppm. Can be detected by smell at 20 ppm or above. >10 ppm will damage lung surface. >20 ppm will increase susceptibility to respiratory diseases. >25 ppm may reduce growth rate depending upon temperature and age.
Carbon Dioxide	Ideal level <3,000 ppm. >3,500 ppm causes ascites. Carbon dioxide is fatal at high levels
Carbon Monoxide	Ideal level <10 ppm. >50 ppm affects bird health. Carbon monoxide is fatal at high levels.
Dust	Damage to respiratory tract lining and increased susceptibility to disease. Dust levels within the house should be kept to a minimum.
Humidity	Ideal level 50-60% after brooding. Effects vary with temperature. At >29°C (84°F), if RH is >70% or <50%, particularly during brooding, performance will be affected.

Transitional Ventilation

Transitional ventilation is used when the house temperature increases above the desired (or set point) temperature, but it is not yet warm enough to use tunnel ventilation.

A general guideline for transitional, there should be sufficient side inlets to be able to use 40-50% of the tunnel fan capacity without opening the tunnel inlets. It is acceptable to use only tunnel fans, or a combination of side wall and tunnel fans.

During transitional ventilation, the tunnel inlet must be closed and all air enters only through the side inlets. The inlets direct the air along the ceiling to the middle of the house (as in minimum ventilation). The fans run continuously, and the heaters are off.

Tunnel Ventilation

Keeps the birds feeling cool.

Switch from transitional ventilation to tunnel ventilation when birds need the cooling effect of wind chill.

Younger birds that are not fully feathered will feel a greater wind chill than older birds and so are more prone to chilling.

Wind chill is used to describe how air temperature is perceived by the bird when a combination of air temperature and air speed move across the bird's body. A higher wind speed means a greater cooling effect.

PROCEDURE

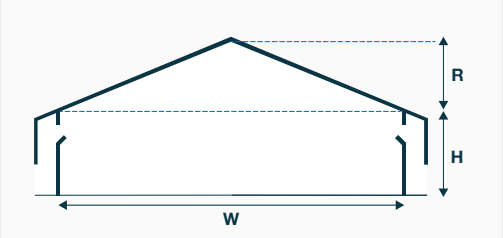
Tunnel Ventilation Calculations

1. Determine the fan capacity required for a given air speed.

Required fan capacity = design air speed x cross section area

Where:

Design air speed (min).
2.03 m / sec or 400 ft / min for rearing.



Cross section area = 0.5 x W x R + W x H.

Cross section area is the effective area through which the air flows down the length of the house. If there are other major obstructions such as nests in the house, then the area of these obstructions can be subtracted from the total cross section area.

2. Determine the number of fans required:

$$\text{Number of fans} = \frac{\text{Required fan capacity}}{\text{Capacity per fan at assumed pressure}}$$

Evaporative Cooling Systems

Evaporative cooling is the cooling of air through the evaporation of water.

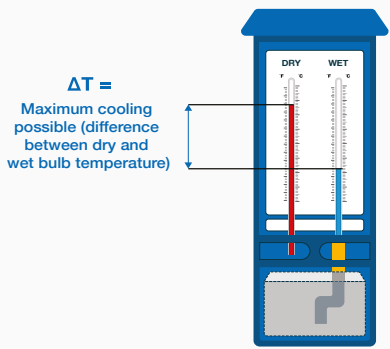
Effectiveness of evaporative cooling systems depends on the RH levels.

Evaporative cooling adds moisture to the air and increases RH. It is important to operate the system based on RH, as well as dry bulb temperature, to ensure bird welfare.

MANAGEMENT FUNDAMENTAL

If in-house RH levels reach more than 70-80%, turn off the evaporative cooling system.

Maximum cooling possible during evaporative cooling is about 75% of the difference between dry and wet bulb temperature.



Fogging / Misting

Fogging systems cool incoming air by evaporation of water created by pumping water through spray / fogger nozzles.

There are three types of fogging systems:

- Low pressure, 7-14 bar; droplet size up to 30 microns.
- High pressure, 28-41 bar; droplet size 10-15 microns.
- Ultra high-pressure (misting), 48-69 bar; droplet size 5 microns.

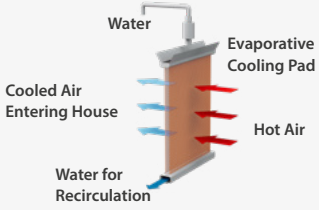
Fogging lines must be placed near air inlets in order to maximize the speed of evaporation, and additional lines should be added throughout the house.

Pad Cooling

In pad cooling systems, cool air is drawn through a wet cooling pad by the tunnel ventilation fans.

Cooling pad area (m^2) = total operating fan capacity (m^3 / hr) ÷ design air speed through cooling pads (m / s) ÷ 3,600
or
Cooling pad area (ft^2) = total operating fan capacity (cfm) ÷ design air speed through cooling pads (fpm)

Pad cooling with tunnel ventilation.



Evaluating Ventilation

Spread / distribution of the birds:

Are they well spread?

Are there specific areas of the house that are being avoided?

Bird activity:

Birds should be feeding, drinking, resting or scratching dependent on farm routines. During lay, there should be mating activity and birds using nest boxes.

Are they sitting, huddling together, showing signs of being too cold?

Are they holding their wings away from their bodies, showing signs of being too warm?

Over and above thermometer / sensor readings, visible bird comfort and behavior are the best indicators of how well the ventilation system is being operated.

Bird Heat Loss

There are two methods by which birds are able to lose heat, sensible heat loss (SHL) and latent heat loss (LHL).

When air temperature is "cool", most of the heat loss comes from SHL, because the bird is able to lose warm air from its body to the surrounding cooler air.

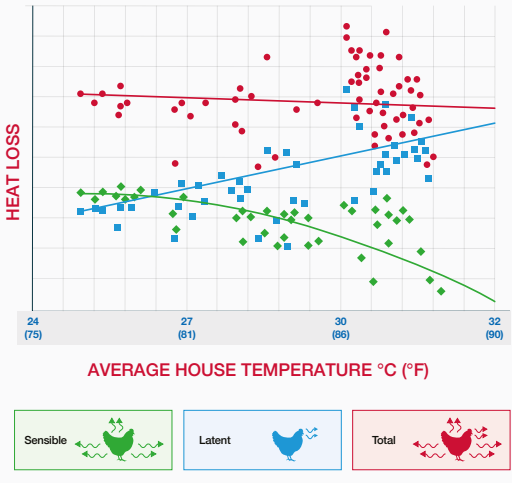
As house temperature increases, the birds ability to lose heat to the air via SHL decreases. This is where the bird will begin to pant to lose heat via evaporative cooling, known as LHL.

Because LHL involves the evaporation of moisture from the respiratory system of the bird, it is important to try to minimize the RH in the house as much as possible in the given ambient climate.

High air speed and a short air exchange time are critical in hot and humid climates.

An evaporative cooling system should always operate based on a combination of temperature and RH, and never based purely on temperature and / or time of day.

Sensible and latent heat loss.



SECTION 5

Nutrition

Objectives

To optimize welfare, reproductive potential (of both males and females) and chick quality by supplying a range of balanced diets that meet the requirements of broiler parent stock at all stages of their development and production.

Nutrition **77**

Nutrition

Birds respond to daily intakes of nutrients, therefore feeding programs (and feed levels) must relate to dietary nutrient content; especially energy and the nutritional requirements of the bird at a given age.

Diets need to be regularly sampled and the samples analyzed to ensure that the diet is as it should be.

Feeding Programs

The Laying Stage

Performance during the laying stage is often affected by feeding and management practices applied during earlier stages of growth. Increasing feed allowances because of poor egg production should be undertaken with caution and a clear understanding of the flock's nutritional status.

In most flocks, using more than one breeder feed may be nutritionally advantageous in meeting the increasing calcium and reduced amino acid requirements of older females. **Arbor Acres Parent Stock Nutrition Specifications** advise a 3-stage feeding program in production to optimize nutrient needs, feed costs, egg weights and body conditioning.

Consequences for the laying flock of not meeting the nutrient specifications.

	Effect of Undersupply	Effect of Oversupply
Crude protein	Depends on amino acid levels, but generally results in poor feathering, decreased egg size and number. Poor chick quality from young flocks.	Increased egg size and lower hatchability. Increased metabolic stress during hot weather conditions.
Energy	Body weight, egg size and egg number will decrease unless feed quantity is adjusted.	Excess leads to increased double yolks, oversized eggs and obesity. Late fertility / hatchability suffer.
Lysine, methionine & cystine	Decreased egg size and number.	Excess lysine leads to high egg weights and body weights. In early production excess lysine could lead to double yolks, peritonitis, prolapses and mortality.
Linoleic acid	Decreased egg size.	
Calcium	Poor shell quality.	Reduced availability of nutrients.
Available phosphorous	May impair egg production and hatchability. Reduced bone ash in chicks.	Decreased shell quality.

If a separate male diet is used, it should be introduced when birds reach 5% hen-day production.

Energy

Recommended feeding levels in the **Arbor Acres Parent Stock Performance Objectives** assume a given dietary energy level per kg (lb) for starter, grower and laying flocks. Because birds respond to nutrient intake (not nutrient concentration), if diets have feed nutrient levels different from those assumed, then proportional changes in feed allowances must be made.

An example of adjusting feed volumes for a 2,800 kcal / kg (1,270 kcal / lb) to a 2,700 kcal / kg (1,225 kcal / lb) feed.

METRIC

Energy intake	= Feed volume x (Energy of current feed ÷ 1,000) = 166 g / bird / day x (2,800 kcal/kg ÷ 1,000) = 464.8 kcal / bird / day
Adjusted feed intake	= Energy intake ÷ Energy of new feed = 464.8 kcal / bird / day ÷ (2,700 kcal/kg ÷ 1,000) = 172 g / bird / day

IMPERIAL

Energy intake	= Feed volume x (Energy of current feed ÷ 1,000) = 36.6 lbs / 100 birds x 1,269 kcal / lb = 46,445.4 kcal / 100 birds
Adjusted feed intake	= Energy intake ÷ Energy of new feed = 46,445.4 kcal / 100 birds ÷ 1,224 kcal / lb = 37.9 lbs / 100 birds

Adjustment of energy (feed) intake must be based largely on observation of the birds' responses in body weight, body condition, feed clean-up time and egg mass.

Energy content of successive feeds should not vary widely. Feed changes should be gradual and carefully controlled, especially when changing diets (e.g., transition from pre-breeder to breeder rations).

Temperature Effect on Energy Requirements

As operating temperature differs from 23°C (73°F), energy intakes should be adjusted pro rata as follows:

Increased by 6 kcal (1.2 kcal / 1°C) per bird per day if temperature is decreased by 5°C (9°F) from 23 to 18°C (73 to 64°F).

Reduced by 7 kcal (1.4 kcal / 1°C) per bird per day if temperature is increased from 23 to 28°C (73 to 82°F).

When temperatures are above 28°C (82°F) the relationship is not as straight forward. Feed composition, feed amount and environmental management should be controlled to reduce heat stress.

Feed Management

Feed deliveries should be scheduled so that feed does not reside in farm feed bins for excessive periods of time (i.e., >10 days). Feed bins should always remain covered and be in good condition to prevent water entry. Feed bags should be stored in a dry, clean, vermin free place, off the floor and inspected for any damage before given to birds. Any feed spills should be cleaned up promptly.

Use a standard weight to check the accuracy of the feed scales daily before use.

A visual assessment of every feed delivery should be made. The feed should be assessed on its physical quality, color, appearance, and smell. For mash, check that there is good distribution of raw materials throughout the feed.

A program of monitoring the quality of finished feed is necessary, which should include both feed mill and farm sampling.

Water is an essential ingredient for life and birds should have unlimited access to clean, fresh water at all times.

General rule of thumb is a minimum of 1.6:1 (water:feed) at 21°C (70°F).

SECTION 6

Health and Biosecurity

Objectives

- To achieve hygienic conditions within the poultry house, and to minimize the adverse effects of disease.
- To attain optimum performance and bird welfare, and to provide assurance on food safety issues.

Health and Biosecurity **83**
Health Management **89**

Health and Biosecurity

Preventing Diseases Transmitted by Humans

Minimize the number of visitors and prevent unauthorized access to the farm.
All people entering the farm should follow a biosecurity procedure.
It is recommended to only visit one farm per day.
If visiting multiple farm is unavoidable, visit facilities or houses with young birds first before moving to older birds.
Maintain a record of visitors.
Workers and visitors should wash and sanitize boots and hands when entering and leaving the poultry house.
Only necessary items should be taken into the house and only after they have been properly cleaned and disinfected.

On-farm biosecurity

Preventing Diseases Transmitted by Animals

- Place farm on an "all in / all out" placement cycle.
- A minimum downtime of 3 weeks (21 days) will reduce contamination on the farm.
- Keep all vegetation cut 15 m (49 ft) away from the buildings to prevent entry of rodents and wild animals.
- Do not leave equipment, building materials or litter lying around.
- Clean up feed spills as soon as they occur.
- Store litter material in bags or inside a storage building or bin.
- Keep wild birds and pets out of all buildings and the fenced farm area.
- Maintain an effective rodent control program.
- Use an integrated pest management program including mechanical, biological and chemical controls.

Site Cleaning

MANAGEMENT FUNDAMENTAL

Site cleaning must cover both the interior and exterior of the house, all equipment, external house areas and the feeding and drinking systems.

PROCEDURE

Site Cleaning

1. **Plan.**

2. **Control insects:**

   Once the flock has been removed, while the house is still warm, spray litter, equipment and surfaces with an insecticide.

   Spraying with an approved insecticide may also be done 2 weeks (14 days) before depletion.

   A second treatment of insecticide should also occur prior to fumigation.

3. **Remove dust.**

4. **Pre-spray with an approved detergent solution throughout the inside of the house.**

5. **Remove all equipment.**

6. **Remove and dispose of litter.**

7. **Wash using a pressure washer with foam detergent, and rinse with hot water.**

PROCEDURE

Cleaning Water Systems

1. Drain pipes and header tanks.
2. Cleaning the nipple regulator.
3. Flush lines with clean water.
4. Scrub header tanks to remove scale and biofilm deposit and drain to the exterior of the house. If physical cleaning is not possible, cleaning of water lines between flocks may be done using high levels (140 ppm) of chlorine or per-oxygen compounds.
5. Refill the tank with fresh water and add an approved water sanitizer.
6. Run the sanitizer solution through the drinker lines from the header tank, ensuring that there are no air locks.
7. Make up header tank to normal operating level with additional sanitizer and solution at appropriate strength. Replace lid and allow disinfectant to remain for a minimum of 4 hours.
8. Drain and rinse with fresh water.
9. Ensure water lines are flushed completely before birds are allowed to drink.
10. Test water quality routinely for bacterial and mineral contamination and take necessary corrective action based on the test results. Take samples from source, storage tank and drinker points.

PROCEDURE
Cleaning Feeding Systems
1. Empty, wash and disinfect all feeding equipment.
2. Empty bulk bins and connecting pipes and brush out where possible.
3. Clean out and seal all openings.
4. Fumigate wherever possible.

Disinfection

Disinfection should not take place until the whole building (including the external area) is thoroughly cleaned and all repairs are completed.
Disinfectants are ineffective in the presence of dirt and organic matter.
Manufacturers' instructions must be followed at all times.
Disinfectant should be applied using either a pressure-washer or backpack sprayer.
Foam disinfectants allow greater contact time.
Heating houses to high temperatures after sealing can enhance disinfection.
If using a selective coccidial treatment, this should only be used by suitably trained staff and should be applied to all clean internal surfaces.

Evaluation of Farm Cleaning and Disinfection Efficacy

- Monitor the efficacy and cost of cleaning out and disinfection.
- Complete *Salmonella* isolations and total viable bacterial counts (TVC).
- Monitoring trends in *Salmonella* / TVCs will allow continuous improvement in farm hygiene and comparisons to different cleaning and disinfection methods to be made.
- When cleaning and disinfection has been carried out effectively, the sampling procedure should not isolate any *Salmonella* species.
- For a detailed description of where to sample, and recommendations of how many samples to take, please consult a veterinarian.

Preventing Diseases Transmitted by Humans

- Minimize the number of visitors and prevent unauthorized access to the farm.
- All people entering the farm should follow a biosecurity procedure.
- It is recommended to only visit one farm per day.
- If visiting multiple farm is unavoidable, visit facilities or houses with youngest birds first before moving to older birds.
- Maintain a record of visitors.
- Workers and visitors should wash and sanitize boots and hands when entering and leaving the poultry house.
- Only necessary items can be taken into the house and only after they have been properly cleaned and disinfected.

Health Management

- Good management and biosecurity will prevent many poultry diseases.
- Monitor feed and water intake for the first signs of a disease challenge.
- Respond promptly to any signs of a disease challenge by completing post-mortem examinations and contacting a veterinarian.
- Vaccination alone cannot prevent flocks from overwhelming disease challenges and poor management.
- Vaccination is most effective when disease challenges are minimized through well designed biosecurity and management programs.
- Base vaccination programs on local disease challenges and availability of vaccine.
- Properly discard vaccine bottles and vials after use.
- Monitor and control worm burden.
- *Salmonella* infection via feed is a threat to flock health. Heat treatment and monitoring of raw materials will minimize the risk of contamination.
- Only use antibiotics to treat disease with veterinary supervision.
- Keep records and monitor flock health.

Aviagen®

www.aviagen.com

Every attempt has been made to ensure the accuracy and relevance of the information presented. However, Aviagen accepts no liability for the consequences of using the information for the management of chickens.

For further information on the management of Arbor Acres stock, please contact your local Arbor Acres representative.