A fluffy yellow chick stands in a brooder, looking up at a water dispenser. The dispenser has several red nipples hanging from a black pipe. The chick is on a bed of wood shavings. Other chicks are visible in the background.

Brooding Guide
for Optimum
Breeder
Development

brooding

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INTRODUCTION



The brooding period, generally considered as the period of time from placement through 14 days, is perhaps the most important time in a bird's life. The brooding period is the most sensitive because the bird is changing from an immature thermo regulation system to a mature system. Survival of the newly hatched chick is largely dependent on how quickly and efficiently the transition is made from the hatcher to the farm environment. At no other time during the flock's life is a service person's and producer's job more important. Mistakes made during this critical time may be irreversible and negatively impact performance for the entire life of the flock.

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An understanding of the physiological changes that occur in the chick during the first 2 weeks of life makes it easier to fully appreciate the importance of this developmental phase. These changes include development of the:

Immune system

- Passive immunity is occurring as a result of the transfer of antibodies from the breeder hen through yolk absorption to the developing chick (~2-3 weeks).
- Active immunity is developing from in-ovo & day old vaccinations, field vaccinations and exposure to field pathogens.

Digestive system

- Rapid internal organ growth required for digestion (liver, intestines, pancreas, spleen and bursa).
- Feed conversion & growth rate are more efficient during this time than at any other time in the bird's life.

Skeletal system

- Rapid growth and thickening of long bones required for leg strength and mineral metabolism later in life.

Thermoregulation

- Chicks do not have the ability to regulate body temperature for the first 5 days and thermo regulation is not fully developed until 2 weeks of age. Chick survival is highly dependent on the grower to provide the proper environmental temperature.

Improper brooding practices can result in poor livability, poor flock uniformity and overall poor performance in the pullet and hen house leading to a higher chick cost. Obtaining a body weight at 7 days is an excellent indicator of how successful the brooding management has been. This weight can be used as a "tool" to help illustrate the difference between well managed and poorly managed farms. The target body weight at 7 days is approximately 4 to 4.5 times the day old chick weight. If this level of performance is not achieved, pre-placement and brooding management techniques should be critically evaluated.

The effects of early stress may not be seen until much later in life and may negatively affect the subsequent reproductive performance of the flock. The main reason for insufficient weight gain is low feed consumption. Feed presentation in the form of either a mash or fine crumb with minimal dust content is necessary to obtain adequate feed intake during the first week. An insufficient feed amount and/or insufficient feeder space will negatively affect feed intake, weight gain and flock uniformity. Research has shown that early protein intake has an effect on 4 week weight, flock uniformity and ultimately egg production.

The 7 Brooding Fundamentals to maximizing performance and minimizing cost include:

- Pre-Placement Preparation
- Feed Management
- Light Management
- Water Management
- Temperature Management
- Air Quality & Ventilation
- Grading the Young Flock

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PRE-PLACEMENT PREPARATION

The key to successful rearing lies in an effective management program starting well before chicks arrive at the farm. Rearing facilities should be clean, disease free and biosecure before placing the flock. Detailed cleaning and hygiene procedures are described in the Cobb Breeder Management Guide. Biosecurity regulations should be enforced year round even when the farm is empty between placements.

The entire floor should be covered with 3-4" (7.5-10.0 cm) of a good quality litter material to prevent heat loss. Litter should be spread as evenly as possible throughout the house to help ensure an even floor temperature. Uneven floor temperatures can cause chicks to huddle in pockets or under equipment. In addition to this, uneven litter can impede chick mobility and restrict access to feed and water due to the uneven height of feed and water lines.

Water lines should be cleaned, sanitized and thoroughly flushed prior to flock placement. Water line pressure should be readjusted from the previous flock to a pressure suitable for the baby chick.

Stocking density should take into consideration environmental/local climatic conditions and the type of equipment being used. Males should be given proportionately more floor space than females to help ensure they achieve target body weight goals.

The Pre-Placement period is the ideal time to prepare the "Chick Comfort Zone"; the area surrounding the edge of the brooder where the baby chick does not have to make a choice between feed, water or heat. Equipment placement is critical to accomplish this objective.

Sex Separate Brooding Space Requirements (0-4 weeks)

		Females	Males
Floor	Litter (birds/m ²)	10.8	10.8
	Litter (ft. ² /bird)	1.0	1.0
Feeder	Chain (cm/bird)	5.0	7.5
	Chain (in./bird)	2.0	3.0
	Pan Feeder (birds/pan)	20	20
	Tube Feeder (birds/tube)	20-30	20-30
Water	Trough (cm/bird)	1.5	1.5
	Trough (in./bird)	0.6	0.6
	Nipples (birds/nipple)	10-12	10
	Bell Drinker (birds/bell)	80-100	80

FEED MANAGEMENT

The use of supplemental feeders at placement is recommended to help chicks get off to the best start possible. Trays should be provided at the rate of 1 per 50 chicks and should be placed between the main feed and drinker lines and adjacent to the brooders. Supplemental feeders should be provided for the first 7-10 days, or 14 days for the lighter birds if chicks are graded.



Never place supplemental feed or water directly beneath the brooder where excessive heat may drive chicks away from feed and water. Ensure that supplementary feed never runs empty and remains fresh at all times, never allowing it to become stale or moldy.

“Top dressing” with a small quantity of feed several times throughout the day stimulates feed consumption and is a better management practice than having too much feed out at any given time. After the first 2-3 days, feeder trays should gradually be moved closer to the automated feeding system, followed by trays being removed from the house gradually over several days. It is a good management practice to gently walk chicks 2-3 times per day to help stimulate feed and water consumption the first several days post placement. Flocks that fail to make a quick transition to feed and water can potentially suffer from higher early mortality.

If chicks are placed the same day they hatch, the crops of chicks should be checked the morning after placement (“Crop Check”) to ensure they have found feed and water. If they are placed the day following hatch, crops should be checked 8 hours post placement to evaluate feed and water intake. At this time, a minimum of 95% of the crops should feel soft and pliable indicating chicks have successfully located feed and water. Hard crops indicate chicks have not found adequate water and water availability should be checked immediately. Swollen and distended crops indicate chicks have located water but insufficient feed and in this case the availability and consistency of the feed should be immediately evaluated.

Chick Crop Check - Sample 100 Chicks

- A minimum of 95% of the bird's crops should be filled upon examination the morning after placement.
- If the crops are checked eight hours after placement a minimum of 85% crop fill should be achieved containing both feed and water.
- Sample 100 chicks per brood area
- Evaluate crop fill and indicate results on form as below:

Crop fill	No. of chicks	Full-Pliable <i>Feed & water</i>	Full-Hard <i>Only feed</i>	Full-Soft <i>Only water</i>	Empty
Evaluation					

Starter feed should be fed during this period in either a mash or fine crumb form. Males and females should be given the amount of feed necessary to achieve the recommended bodyweight at 7 days. Achieving a uniform body weight and frame size at 4 weeks of age is an essential component to getting the flock off to the best possible start during this start-up period. Males need to achieve the body weight standard each week for the first 4 weeks of age. A longer ad libitum feeding period is recommended for males if they fail to achieve the desired body weight at 28 days. Males should be grown separately from females for at least the first 6 weeks of age, however complete sex-separate rearing to housing between 140-154 days is recommended for best results.

Provide adequate feeder space for males and females at all times taking into consideration the flock age. Ideally, pullets should be reared with a minimum of 4.5" (11.50 cm) of feeder space and males with a minimum of 6.0" (15.0 cm) from 4 weeks of age up to housing.

The feeding time should be consistent from day to day and feed should be distributed evenly to all birds throughout the house in less than 3 minutes from the time the feeder starts. Adjust feed hopper gates or feeder run times so that feed makes it around the house, or as far as possible, to provide the most feeder space per bird. The feed trough or pan height should be adjusted so that they rest on the litter during the first 14 days to ensure all birds can easily access feed without having to climb into the feeder. Thereafter, feeders should be raised incrementally throughout the growing period so that the lip of the trough or pan is level with the birds' back at all times. Weekly feed increases should be based on body weight targets.

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LIGHTING MANAGEMENT

Continuous lighting should be provided for the first 48-72 hours post placement. Provide an intensity of 20-60 lux (~2.0-6.0 ft. candles) for the first 7 days to help chicks find feed and water more easily. It is highly recommended that all rearing houses be light tight with all flocks grown under blackout conditions.

Blackout Rearing Lighting Program (0-4 weeks)			
Age Days	Hours of Light	Light Intensity	
		FC	Lux
0-3	23	2.0-6.0	20-60
4-7	16	2.0	20
8-14	12	1.0	10
14-28	8	0.5	5

*In the first 4 weeks, maintain adequate daylength so the birds have time to consume the complete amount fed.

WATER MANAGEMENT

Water has been called “the invisible player” in brooding issues and is an essential nutrient that impacts virtually all physiological functions. It is essential to provide easy access to fresh clean water so that feed intake and growth are maintained. Supplemental drinkers are highly recommended at placement and should be provided at the rate of 1 per 100 chicks from day old to 7 days. Preferably, mini drinkers, easy fills or one gallon chick fonts should be used rather than open trays. Clip-on cups made for nipple drinker lines can be used, however for best results these should be used in combination with easy fills or chick fonts for maximum water consumption.



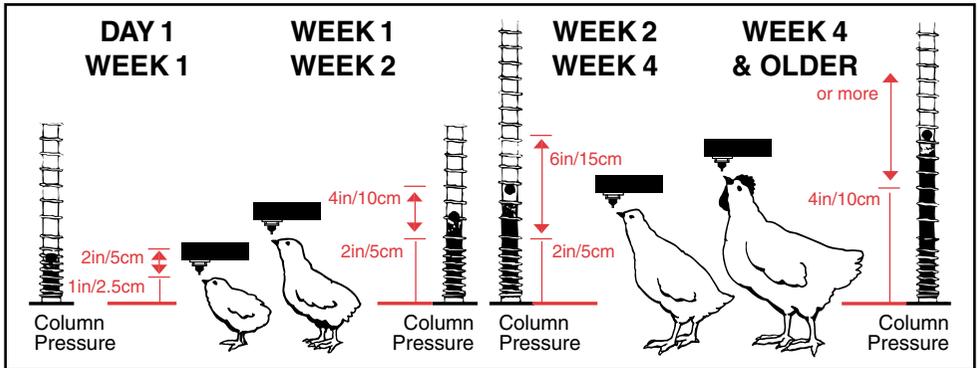
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Supplemental water should be placed in the “Chick Comfort Zone” between feeders and close to brooder stoves or the heat source for the first 3-5 days and then gradually removed. The water temperature should be tepid (~80°F/26.7°C). Bio-degradable paper placed near the water lines has been shown to help attract chicks to nipple drinkers resulting in chicks using nipples more quickly after placement. In addition to the supplemental water source, chicks should have access to the main drinking system at placement. Provided the proper water pressure has been set, nipple activation should leave a small droplet of water at the tip of the nipple to further stimulate the curiosity of the baby chick. Nipple drinkers should be installed at the rate of 10-12 birds per nipple and birds should not have to travel more than 10 ft. (3 m) to access water. They should be adjusted per the manufacture’s recommendations for height and operating pressure. Generally the height of the nipple line should be at eye level for the first 48-72 hours post placement. Begin raising nipple lines on the 4th day so birds are drinking at a 45° angle.



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From this time on raise lines up gradually so birds are drinking straight up by the 10th day. While drinking, a bird's feet should remain flat on the floor at all times.



Litter conditions are an excellent means of assessing the effectiveness of water system settings. Damp litter under the water source indicates drinkers are set too low or pressure is too high. Excessively dry litter under drinkers may indicate water pressure is too low or the nipple line is too high for easy access. Nipple water line sight tubes should be kept clean at all times and pressure adjustments should be made in small increments.

Monitoring water consumption through the use of water meters can be an excellent means of gauging feed as there is a high correlation between feed and water consumption. Water meters should be sized the same as the incoming water supply line to ensure adequate flow rate. Water consumption should be evaluated at the same time each day to best determine general performance trends and bird well-being. Any substantial change in water usage should be investigated as this may indicate a water leak, health change or feed issue. A drop in water consumption is often the first indicator of a flock problem.

Water consumption should equal approximately 1.6-2.0 times the feed intake by weight on a daily basis at 70° F (21.1°C). Intake will vary based on environmental temperature, feed quality and bird health. Erratic water intake fluctuations should be investigated before restricting water availability, which should not be a standard practice.

According to research conducted by Viola et al. (2003), a 40% water restriction decreases the feed intake (from 542 g to 338 g), body weight (from 471 g to 295 g) and FCR (up from 1.28 to 1.37) at 14 days. Water consumption for the first 24 hours should be approximately 24 mls. (0.8 oz./bird).

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TEMPERATURE MANAGEMENT

Prior to chick placement, brooders and space heaters should be checked regularly to ensure they are working correctly. House pre-heating should commence 24 to 48 hours prior to placement depending on climatic and house conditions. Pre-heating ensures that the floor, litter, water and air temperatures are ideal for baby chick placement.

The use of a brooder guard is recommended for the first 5-7 days to confine chicks to the "Chick Comfort Zone". Guards should be 14-18" (35-46 cm) high and made of 1" (2.5 cm). mesh wire. Brooder guards generally run the full length of the house and should be removed after the 7th day.

Maximum Density- Brooding	
Pancake (jet) Brooders	400-600 birds/ brooder
Infrared (radiant) Brooders	750-1000 birds/ brooder
Forced Air Furnaces	21 birds/m ² (0.5 ft. ² /bird)

With **pancake type brooders**, the ideal floor temperature directly under the brooder is 105°F (40.5°C), approximately the same temperature as the internal temperature of a brooding hen. The floor temperature at the brooder edge should be in the range of 85-90°F (29-32°C).

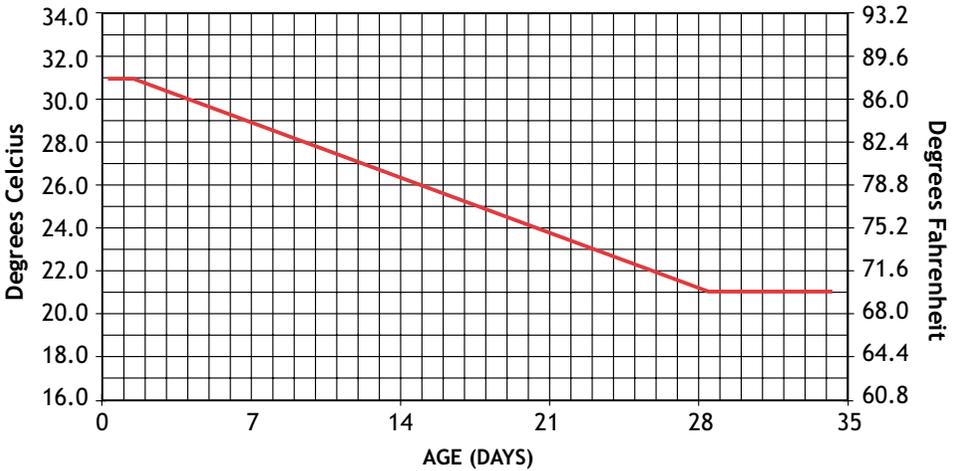
With **whole-house space heating**, the ideal floor temperature should be at least 90°F (32°C).

Observe chicks and adjust for their comfort, making sure not to overheat. Chicks that become overheated or chilled will experience problems such as pasting, unabsorbed yolks, stress and dehydration. Good performance requires close monitoring and adjustment of brooder temperatures and house ventilation to prevent these conditions from occurring. An excellent indicator of floor temperature is the temperature of the chick's feet. If the feet are cold, reevaluate the heating system and litter temperature. If they are comfortably warm, the chicks should be actively moving around the brooding area.

Brooding Guide for Optimum Breeder Development

Measuring the Ambient Temperature

Ambient Brooding temperature profile for Cobb 500 parent breeders



Temperature Guide		
Age (weeks)	Temperature at Brooder Edge (2" above the litter)	Floor Temperature at Brooder Edge
1	95 °F (35 °C)	90 °F (32 °C)
2	90 °F (32 °C)	85 °F (29 °C)
3	85 °F (29 °C)	80 °F (27 °C)
4	80 °F (27 °C)	75 °F (24 °C)

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The internal chick temperature should be used as a guide to help determine if temperature control is being managed properly.

Temperature can be measured using a child's ear thermometer.



Internal chick temperature guidelines include the following:

1. The internal temperature of the newly hatched chick should range from 40-41 °C (104-106 °F), increasing to 41-42 °C (106-108 °F) during the 1st 5 days.
2. An internal chick temperature >41.0 °C (106 °F) will lead to panting.
3. An internal chick temperature <40.0 °C (104 °F) indicates the chick is too cold.
4. A comfortable chick will breathe through its nostrils and lose 1-2 g of moisture in the first 24 hours.
5. The yolk also contains 1-2 g of moisture so the chick will lose weight but not become dehydrated.
6. If chicks start panting they can lose 5-10 g of moisture in the first 24 hours and then dehydration will occur.
7. Higher relative humidity will reduce moisture loss but also impair heat loss, so the correct temperature is vital.
8. Chicks from smaller eggs (younger breeder flocks) require higher brooding temperatures because they produce less heat.
9. The yolk contains 2/3 fat and 1/3 protein; fat for energy and the protein for growth.
10. The yolk content should be less than 10% of the total chick weight.
11. If early feed consumption doesn't take place the chick will use both fat and protein in the yolk for energy resulting in inadequate protein levels for growth.

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AIR QUALITY AND VENTILATION

In addition to proper temperature regulation, air quality and ventilation needs to be considered. Ventilation distributes heat evenly throughout the house and maintains optimum air quality in the brooding area. "Minimum ventilation" should begin with house preheating 24-48 hours prior to placement to remove waste gases and moisture. Young birds are very susceptible to drafts and air speeds as slow as 100 ft./min. (0.5 m/sec.) can create a significant wind-chill effect on day old birds. Minimum ventilation practices should be employed to circumvent inadvertent chilling up to 14 days of age.

Definition of Good Air Quality	
Oxygen	> 19.6%
Carbon dioxide	< 0.3%/3000 ppm
Carbon monoxide	< 10 ppm
Ammonia	< 10 ppm
Inspirable Dust	< 3.4mg/m ³
Relative Humidity	>< 45-65%

> No less than
 < No more than
 >< In between

**Minimum ventilation must be increased if these parameters are not being met.

EFFECTS ON AIR QUALITY WHEN MINIMUM VENTILATION FANS DO NOT RUN

Minimum ventilation fans should be programmed to run on cycle timers (5 or 10 minute cycles) with a thermostat override. They should be set to operate a minimum of 20% of the total fan run time. As fan volume increases (or decreases), the inlet volume must react to pressure changes in the same proportion as the fan capacity. Poor air quality during rearing negatively affects pullet/ cockerel health and performance and can also have an adverse effect on overall flock productivity in terms of egg production, livability, fertility and hatchability.

Air Quality				
Fan off time:	0 minutes	5 minutes	10 minutes	15 minutes
Ammonia	15 PPM	35 PPM	50 PPM	80 PPM
Carbon Dioxide	300 PPM	1500 PPM	2600 PPM	3500 PPM
Humidity	68 %	78 %	86 %	97 %
Temperature	68 °F	75 °F	82 °F	88 °F

Air quality decreases rapidly when fans are off. This can potentially result in damage to the respiratory and immune systems.

With CO2 levels above 1000ppm it is possible to see signs in the birds of reduced activity and consumption reduction.

VENTILATION GUIDELINES

1. Tunnel ventilation should never be used prior to 28 days of age. Birds are never fully feathered until after 28 days of age.
2. Air speed across the birds should be maintained as low as possible (< 40 fpm/0.3m/sec) for the first 14 days. The “actual air temperature” should be the primary consideration in determining the correct temperature setting.
3. From 15-21 days of age, air speed should not exceed 100 fpm (0.5m/sec). A “transitional” ventilation system can be used and the “effective air temperature” should be the primary consideration in determining the correct temperature setting.
4. From 22-28 days of age, air speed should not exceed 200 fpm (1m/sec). Again, a “transitional” ventilation system can be used and the “effective air temperature” should be the primary consideration in determining the correct temperature setting.
5. After 29 days of age, air speed does not have to be restricted and evaporative cooling can be used if needed. The “effective temperature & the relative humidity” should be the primary consideration in determining the correct temperature setting.
6. Chicken houses should never be ventilated to suit only the grower.
7. For management techniques for pullets or breeders raised in high altitudes (above 800m/2,600 ft.) please contact your Cobb technical service representative in your region.

For more detailed Air Quality & Ventilation information, refer to the *Cobb Breeder Management Guide*.



GRADING THE YOUNG FLOCK

Birds grow at different rates not only from their genetic potential but also due to acquired eating temperament. The birds with more aggressive appetites will push the timid birds to the side and consume more than their share at the expense of smaller birds.

This will continue and is especially detrimental when there are shortcomings in feeder space, temperature, air and water quality, or feed delivery times. Grading of birds by bodyweight is the best way to improve and maintain flock uniformity. The smaller birds graded into a separate pen are the most timid ones and will always remain so. Because of this, they will need to stay in pens with the other timid birds rather than be re-introduced into the general population to be pushed aside again.

There are several grading programs practiced around the world, but all agree that grading is best done as early in life as possible. Then this will have time to affect the frame size, generally established before 4-5 weeks of age. Production results have been improved by grading the flock by weight as early as 7 days and placing birds of similar weights into separate pens. Using four groups seems to work the best: The medium group, which will be the highest number, will have all birds plus or minus 10% of the average weight; the heavy group, with chicks more than 10% heavier than the average; the light group, with birds 10 to 20% under the average; and the super-light group, with birds more than 20% under the average weight.

The birds are then placed into different pens so they can be fed separately using the amount and ration that best meets their needs. Smaller birds can be fed more of a higher density diet early enough to give them the extra nutrients they need to catch up to the average birds in the flock. The heavier birds can be fed the amount normally fed to the medium group, and their growth rate will be controlled as they will only compete with like size birds.

Grading by weight can be carried out as needed to establish and maintain uniformity.

SUMMARY

The first 4 weeks of a baby chick's life is a critical time that contributes to the overall flock productivity. At placement, baby chicks are entirely dependent on grower management for survival. The objective of the brooding period is to create the ideal environmental conditions where the chick does not have to make a choice. Grower attention to detailed management is essential to accomplishing this objective.

NOTES

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