

Commercial

Emu Production

The economic value of the emu is dependent upon the oil, meat, and hide. At market age (15 to 18 months), an emu can yield approximately five liters of oil. This oil is an unsaturated fat and it is currently being used in skin care products and topical arthritis creams. Emu meat is low in fat and cholesterol. A 100-gram (or 3.5 ounce) serving of emu meat contains of 23.3 grams of protein, 109 calories, 57.5 milligrams of cholesterol, 1.7 grams of fat, and 0.6 grams of saturated fat. Emu leather is a fine-grained hide that is being used by the fashion industry in Europe. Once the slaughter and post-slaughter markets are established, the farming of emu may become a successful alternative agricultural business.

North Carolina Cooperative
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University

The emu originated in Australia and belongs to an order of flightless birds called ratites. Other ratites include the ostrich (South Africa), rhea (South America), casowary (Australia), and kiwi (New Zealand). The farming of Emu is well established in Australia and is gaining popularity in the United States.

Getting Started

An emu business can be started in any of the following ways:

- Buy eggs and hatch chicks — requires the least capital initially, provided eggs can be obtained at reasonable cost. However, production is at least 2 years away.
- Buy started, sexed chicks (8 weeks or older) — reduces problems involved in hatching and early brooding but will, of course, be more expensive than eggs. Again, production is at least 2 years away.
- Buy juveniles (year-old-birds) — offers the opportunity to select quality birds within a year of sexual maturity.

- Buy proven breeders — the expensive route, but enables the producer to begin production immediately.
- Any combination of the above.

When buying breeding stock, producers should avoid potential in-breeding problems. Avoid purchasing cull stock and non-breeders. Obtain only guaranteed breeders from reliable sources. Be realistic on price. Before attempting such an undertaking it is highly recommended that marketing information for breeder birds and emu products be investigated. Information can be obtained by contacting:

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|---|---|
| <input type="checkbox"/> N.C. Emu Association
4246 Hwy 49, South
Asheboro, NC 27203
(910) 857-2789 | <input type="checkbox"/> American Emu Association
P.O.Box 8174
Dallas, TX 75205
(214) 559-2321 |
| <input type="checkbox"/> Emu Ranchers, Inc.
Box 835970
Richardson, TX 75083
(214) 991-8891 | <input type="checkbox"/> Emu Marketing
P.O. Box 8311
Dallas, TX 75205 |

Methods for raising emus vary and no two emu farms are alike, so it is difficult to predict production costs. Accurate expenses and profits can only be predicted from the feed costs, and the market value of emu products and eggs within your market area.

One thing to remember in evaluating start-up costs of an emu farm is that the cost will be amortized over the life of the operation. This will reduce the cost per bird or egg over the operation's lifespan.

Housing and Facilities

Adult and young birds must have adequate protection from adverse weather conditions. One adult breeder pair of emu can be housed in a shelter at least 8 by 8 feet that is covered on top and on two or three sides. In areas of extreme cold, such as in the mountains, shelters or barns should be completely enclosed and heated. Emus need a pen and pasture. Pasture size can range from ½ to 2 acres per pair of birds. Alleyways between pens, barns, and pastures allow simple and safer movement of birds. Fencing can be chain link fence, 2- by 4-inch wire, hog wire, game fencing, or cattle panels with wire on the outside. The recommended height is 5 to 6 feet. Great care should be taken to remove all foreign metal objects, such as nails or staples, from the pen and pasture areas. Such objects can result in severe gastrointestinal problems and death. Some producers have actually used large magnets to remove metal objects after construction of fences and pens.

Young chicks should be brooded in heated areas ranging from 8 ft² to 32 ft² in size. Allow at least 2 ft² per chick. Heat lamps or gas brooders should be used during the first 2 weeks after hatch. As the chicks age, they should be moved progressively to larger areas or pens until 3 months of age, when they can be moved to pastures.

Adults and older juveniles can be ranged on well drained, succulent pasture plots or they can be maintained under dry-lot conditions. Pastured birds should be maintained on small plots and rotated periodically for optimum grazing efficiency. Birds on large acreage may become semi-wild and difficult to manage.

Nutrition

Nutrition-related mortality problems in chicks and young juveniles include malnutrition or starvation, intestinal obstruction, and leg abnormalities, and misinformation

abounds. Recommended starter, grower, maintenance, and breeder diets are summarized in Table 1.

It is absolutely essential that emus have clean water available at all times. They must receive feedstuffs that provide adequate levels of protein and essential amino acids, and meet vitamin, mineral, and energy requirements.

Waterers should be rinsed daily and scrubbed every 3 days with a mild disinfectant. Inexpensive, water soluble vitamins and electrolytes for poultry should be added (at the recommended level) to the drinking water for the first 1 to 3 weeks. The fat soluble vitamins — A, D3, E, and K— are compounded with a starch or protein emulsifier to enhance dispersion and availability in water. This will ensure an adequate intake of vitamins, particularly A and D3.

The following program is practical and has provided excellent results in rearing emu chicks. Start them on a good quality emu starter ration containing at least 20 percent protein. However, some emu producers withhold feed up to 72 hours in newly hatched chicks to allow for the complete reabsorption of the yolk sack. The quality and health of the chick should be carefully evaluated before withholding feed beyond 48 hours.

The starter ration is formulated to provide all nutrients necessary for optimum growth and health during the first 2 weeks of life, and it should be offered in the crumbled form. All other feeds should be pelleted.

Chicks should receive continuous light and have access to the starter ration at all times during the first 3 weeks. After that, they can be fed all the starter ration they will consume in two short (20-minute) daily feeding periods.

Chicks should not be fed excess protein. Too much protein may cause excessive weight gain, which can contribute to leg weakness, leg abnormalities, and death.

While emus do require more fiber than other birds, high-fiber feeds can cause intestinal obstructions in young chicks and result in "starveout" deaths.

NEVER feed any feedstuff that is damp, moldy, musty, or suspect in any way. Botulism or mycotoxicosis leading to intestinal problems may occur. Throw away any damp or moldy feed.

The primary feed ingredients of emu feeds should consist of corn, wheat, and alfalfa. Soybean meal should be mixed at no greater than 300 pounds per ton.

At 8 weeks of age, chicks can be placed on a good quality emu grower ration and fed what they will eat in

Table 1. Nutritional Guidelines for Emus

Calculated Analysis	Starter 0 to 9 wk	Grower 9 to 42 wk	Finisher (42 wk to Mkt Wt)	Breeder (4 - 5 wk before egg production)
Protein (%)	20	16	14	21
ME (cal/lb)	1250	1250	1250	1350
Fat (%)	1.00	1.00	1.00	5.25
Lysine (%)	1.0	4.7	3.60	1.10
Methionine (%)	.42	.29	.25	.35
Methionine + Cystine (%)	.75	.57	.50	.70
Calcium (%)	1.10	1.00	1.70	2.10
Non-Phytate Phosphorus (%)	.55	.42	.35	.39
Total Phosphorous (%)	.79	.66	.58	.61
Salt (%)	.30	.30	.30	.30

two daily feeding periods. Juveniles can be switched to a maintenance diet at 25 weeks of age until they reach sexual maturity. Breeder rations contain a high calcium level and should not be fed to juveniles. The breeder diet should be fed 2 weeks prior to the expected first egg.

Always change from one type of feed to another slowly. Begin mixing the new diet into the diet which you have been feeding your birds. Initially, mix ¼ new to ¾ present diet. After 4 days, mix the diets ½ to ½. After 8 days, mix the diets ¾ to ¼ of the old diet. After 2 weeks of this process, the new diet should totally replace the feed from which the change was made. It is very important to make a slow transition. If a quick change is made, birds may avoid the feed, or develop diarrhea, or other adverse responses may be noted. A feeding program is only as effective as the management practices followed.

Birds should be offered an amount of feed that they will actually consume. Forcing the birds to "clean-up" the feed on a daily basis results in the birds consuming a more balanced diet. This keeps birds from picking through the feed and excluding certain constituents from their diet. A feed that is properly pelleted should not be a problem.

Also, leftover feed will be wasted, get wet and moldy, or draw predators and rodents. None of these alternatives is very good for production. Again, management is very important in accomplishing this recommendation.

The grower must monitor the consumption of the birds very closely. Do not assume that past consumption will predict consumption of new formulations. If feed remains at night, it should be removed. Feed the following day should be consistent with actual consumption of the previous day. Growing birds may eat more in subsequent days. If the feed runs out during the day, increase the feed input by 5 to 10 percent on the following day and record the results. Weighing feed amounts and keeping good records will help establish feeding programs for future birds.

Forages such as alfalfa, red clover, lespedeza, fescue, or Bermuda grass are desirable for juveniles and adults and will reduce

production costs significantly. Some forages may be too tough or high in fiber or too low in protein and energy to provide the nutrient level required for desired growth.

If emus are allowed to forage on natural grasses or grain, try to balance this nutrient intake with the amount of commercial feed that is fed.

Breeding birds on pasture should receive daily supplements of a good quality, high protein emu breeder ration to ensure optimum egg production, fertility, and hatchability. Breeders in dry-lot confinement also should be fed the emu breeder ration.

Emus should not be allowed to become overweight. Excess fat is detrimental to egg production by breeders and to meat quality of birds that are to be slaughtered.

Breeder Flock Management

Well-nourished emu hens begin laying at approximately 2 years of age and are reported to have a productive life of approximately 16 years. Egg production is variable but can exceed 50 eggs per year. After 2 years of age, the average egg production is 25 to 30 eggs per year. Production begins in October and continues into March.

Juvenile hens and cocks should be reared separately from 1 year of age to sexual maturity. Mature hens and cocks should be separated after the breeding season. This will allow the birds to be more rested, and they will begin egg production more readily when placed

together for the breeding season in September. When pairing hens and cocks, always present the cock to the hen in her pen. Sometimes pairs are incompatible and do not mate. If this occurs, present the cock to a different hen.

If eggs are infertile during the early part of the breeding season, this is usually caused by infertility in the cock. The hen will generally lay an egg every 3 days during the breeding season.

The breeding pen for each cock and his hens should be ½ to 2 acres in size and well drained. Birds in larger enclosures are more difficult to manage. Eggs also will be more difficult to find and collect. Ideally, there should be a 6- to 8-foot-wide lane between pens to prevent fighting between cocks. A few trees or shrubs in the pens will provide privacy and help induce mating.

Eggs are normally laid in a shallow scrape, which is a small hole in the ground. They should be collected twice daily. Reproductively active cocks can be extremely protective and aggressive. Caution should be taken when entering their breeding areas. Aggressive cocks can be fed and penned in a catch or holding pen while eggs are collected.

Hatchery Management

Proper management is critical for successful hatchability. Hatchability problems can be caused by inadequate breeder nutrition, mating problems, improper egg handling, incubator or hatcher malfunctions, and humidity or temperature problems.

Successful management of a moderate size hatchery requires a high degree of expertise and attention to detail. Cleanliness is very important. The environmentally controlled hatchery building should be designed for durability and ease of cleaning. It should be of sufficient size to handle anticipated egg volume and must include areas for egg cleaning and culling, egg trays, cooling and storage, incubation and hatching, chick holding, equipment washing, and storage, as well as office and sanitary facilities.

Equipment requirements for the hatchery include a standby generator, forced draft incubators and hatchers, service tables, a vacuum for cleaning, pressure washer, tray washers, and carts. Incubators and hatchers that can be used for emu eggs are manufactured and sold by several commercial companies.

A good ventilation system is a must for successful incubation and hatching. In addition, when building a

hatchery, keep in mind that emu eggs require a low relative humidity (24 to 35 percent). Thus, in areas of the state with high relative humidities during the emu's breeding season, a dehumidifier system should be installed.

Incubation Requirements

Emu eggs should be stored with the large end up at a room temperature of 65 to 70 degrees F. During holding time, the egg should be rotated twice a day. Better hatchability may occur if eggs are set (placed in the incubator) within 2 to 4 days after lay. Longer storage may reduce hatchability.

Never set an excessively dirty egg. Manure or dirt should be gently scraped off or lightly sanded with a fine grit sandpaper. It is generally not advisable to wash eggs unless absolutely necessary. Only in extreme situations should eggs become wet during the cleaning process. Dirty eggs can be flushed with commercially available 3 percent hydrogen peroxide. If eggs are to be wet, the wash water and rinse water must be at least 10 degrees F. warmer than the eggs. An individual towel should be used for each egg and towels should not be reused. Disinfectants should not be used. The use of disinfectants in the cleaning solution can alter the egg shell cuticle and affect the rate of water loss during incubation, thus possibly adversely affecting chick quality and hatch time.

Incubation time to hatch for emu chicks is between 48 and 52 days with about 50 days being the average. The optimum incubation conditions for the emu are in the range of 96.0 to 98.5 degrees F. dry bulb temperature with a relative humidity in the 24 to 35 percent range (wet bulb 70 to 74 degrees F). The higher the dry bulb temperature, the lower relative humidity needs to be. For instance, at a dry bulb temperature of 98.0 degrees F. it is estimated that the relative humidity needs to be as low as 24 percent, whereas at an incubation temperature of 96.0 degrees F the relative humidity may need to be as much as 35 percent. It should be remembered that the higher the incubation dry bulb temperature, the more water is produced in the egg, thus creating the need for a lower incubation humidity to remove that water from the eggs. Individual hatchery incubation requirements will depend on the lowest wet bulb temperature that can be maintained in the setter room when the air conditioners are set on 100 percent fresh air. This will determine the lowest operating humidity of the incubators. All bird eggs lose weight

during the incubation period. The developing embryo produces carbon dioxide and water as by-products of metabolism as it uses oxygen to metabolize yolk lipids and consume albumen proteins. This process can be roughly monitored by weighing the egg. The optimum weight loss for the emu is believed to be between 13 and 17 percent from the time the egg is laid until internal pipping occurs. Your eggs will provide you with the information needed to set the optimum humidity level. Weighing the egg and keeping accurate records is highly recommended for several reasons. If problems are noted in hatchability, these records will provide you with a good reference of the performance of your incubator. In addition, the eggs of some hens do not lose weight as readily as others, while others lose weight too quickly. This information can be used to determine what action may be taken to compensate, such as raising or lowering humidity or increasing or decreasing length of storage.

The weight loss of an egg is not constant during the incubation cycle. A higher weight loss is noted at the beginning and end of the incubation cycle. This is due to the fact that early in incubation more water must be lost from the albumen in order to provide space for oxygen diffusion to the blastoderm. Late in incubation water production (and loss) must increase as metabolic rate increases proportional to the larger embryo size. A low relative humidity must be maintained to allow this vapor loss to occur.

The temperature of the incubator should in all cases be kept as stable as possible. Fluctuating temperatures can be detrimental to your hatch rate. Proper temperature controls have been designed to keep these variations to an absolute minimum. Daily readings of your machine instruments should be made to ensure accuracy and stability. The dry bulb temperature is directly proportional to the rate of embryonic development. The dry bulb temperature also proportionally determines metabolic water production, oxygen demand, and water vapor pressure within the egg.

The humidity also contributes to the control of the rate of gas exchange of an egg during incubation. The higher the humidity, the lower the rate of gas exchange because high humidity slows the release of water from the egg. Gas exchange is the process of oxygen entering the egg and carbon dioxide and water vapor leaving the egg. This is how the embryo breathes. Eggs should be weighed every 5 days to determine if adjustment of the dry and wet bulb temperatures is necessary for a normal

hatch. For example, if a freshly laid egg weighs 500 grams, calculate the ideal weight loss as 15 percent (15% x 500g = 75g total target weight loss). If you are incubating at 97.5 degrees F, you can estimate that the egg should hatch in about 50 days.

$$\text{Target daily weight loss} = 75\text{g} \div 50 \text{ days} = 1.5\text{g/day.}$$

However, it should be remembered that weight loss is not linear because more weight is lost at the beginning and end of incubation.

It is recommended that eggs be transferred to a hatcher no earlier than internal pipping (when a chick pips into the air cell internally). This can be confirmed by candling. If this procedure is followed, the hatch time can be more accurately predicted. If the relative humidity in the hatchery cannot be controlled, the embryo should be allowed to externally pip before moving to the hatcher. It is suggested that the hatcher be maintained at the same relative humidity as the incubator until at least external pipping has occurred. This will allow the egg to lose the water necessary to get the proper oxygen intake during this very critical period of embryo development.

During the final stages of the hatching process and after external pipping, a relative humidity of 30 to 40 percent is recommended. It is also suggested that the hatcher dry bulb temperature be run at 0.5 degrees F. higher than the incubator temperature since the hatcher will routinely have fewer eggs than the incubator.

After hatching, the chicks should be allowed to remain in the hatcher only for the time sufficient to provide for drying without dehydration. A chick that is up and moving about is ready to be removed from the machine. On the average, the holding time after hatch should be about 12 hours.

Brooding

Emu producers often experience high mortality in chicks and young juveniles as the result of improper brooding and poor early management practices. The following recommendations, when effectively implemented and carefully followed, will significantly improve livability and quality of both chicks and juveniles.

Caretakers must be trained and properly supervised to maintain desired conditions and to recognize and correct problems. The brooding facility must be designed to protect chicks from predators (dogs, foxes, etc.) as well as from inclement weather. Chicks should NEVER be allowed to get soaking wet. The brooding area must be

kept dry and sanitary at all times and should be designed for effective ventilation and ease in cleaning. Concrete floors in brooding units make them easy to clean.

Temperatures at chick level should be 88 to 92 degrees F. during the first 10 days of life, then 80 to 85 degrees F. until chicks are 3 weeks of age. From 3 through 8 weeks the ideal temperature is between 70 and 80 degrees F. Chicks must never be exposed to chilling temperatures nor allowed to become overheated. Chicks brooded in small pens with raised wire floors and heated with infrared heat lamps are particularly susceptible to chilling in cool weather. Warm room brooding (uniform temperature throughout the room) will prevent this problem. Space heaters or central heating is recommended.

If chicks are placed on litter material, such as wood shaving, rice hulls, or washed builder's sand, the litter should be covered with burlap for the first 7 to 10 days to keep chicks from eating litter and developing intestinal obstruction problems. After the burlap is removed, the litter or sand should be stirred daily to stimulate drying and prevent packing. Slick surfaces cause spraddle legs, which is always fatal. NEVER cover litter with newspaper, cardboard, plastic, or other slick material or place chicks on such materials.

At 6 to 8 weeks of age, chicks can be ranged outside in good weather, but they must be sheltered at night. They can be managed in groups of 25 to 50 birds. Young emus will swallow anything. Pens must be well drained, clean, and free of coarse, dry vegetation, pebbles, small rocks, wire, staples, and other debris that may cause intestinal obstruction or death, if consumed. Clean up all spilled feed. Again, NEVER allow emus access to moldy, wet, or spoiled feed.

At 4 months of age, chicks are fairly hardy and can be ranged outside with less danger of intestinal obstruction problems. Shelter and shade must be available to protect both birds and feed during inclement weather and at night.

Health

Mortality and health problems diagnosed mainly in chicks and juveniles include starvation and malnutrition, intestinal obstruction, leg abnormalities, and coliform infections. Causes include improper brooding or nutrition, stress, improper handling, and genetics. Diagnoses in a variety of areas in the United States have confirmed enteritis, coccidiosis, Salmonella, Aspergillosis, and

Eastern equine encephalomyelitis (EEE). Parasites identified include lice and ascarids. EEE is the most dangerous viral disease observed in emus in the United States. The EEE virus is transmitted by a species of mosquito, which also means that it will occur more in swampy, low-lying areas with large populations of carrier mosquitos. Symptoms of EEE include staggering, weakness, disorientation, bloody diarrhea, and death. It is hoped that vaccination of emus with the killed vaccine used for horses will prevent the disease, although research is still underway to find out how effective the vaccine is and for how long.

Professional assistance should be obtained promptly when a health problem is suspected. Indiscriminate use of medications can create problems and should be avoided.

General Management Tips

Emus are hardy animals that readily adapt to a variety of climatic conditions. Performance should be satisfactory in most areas, provided adequate shelter is available in pasture plots and pens to protect adults and older juveniles from extreme conditions such as snow, ice, heavy winds, cold rain, and sleet. In summer, shade must be available. Chicks and juveniles younger than 1 year must, of course, be well protected against bad weather.

The shelter should be designed so that birds must enter through a confinement pen. This makes it easier to catch them. Feed and water should be located inside shelters in order to condition birds to enter the shelters freely, as well as to protect feed from the weather. Feeders should be positioned so that caretakers can fill them without being exposed to aggressive males. Both feeders and waterers should be the open type and should be adjustable so that they can be kept at chest height of the birds.

Fences for older juveniles and adults should be at least 5 to 6 feet high. Fence posts should be on the outside of pen areas. Loading chutes and catch pens should be high enough and of solid construction to prevent frightened birds from seeing beyond the pen and attempting to escape by jumping or climbing out.

Tame, gentle emus are much easier to handle and less prone to injury than non-gentle, semi-wild birds. Caretakers should spend time with chicks and young juveniles to tame them. Move gently among the birds, taking care to avoid frightening them. Daily hand-feeding of tidbits to juveniles is recommended. Emus can

be trained to follow but are sometimes difficult to drive. Teaching young emus to follow by trailing pellets, lettuce, etc., will make handling easier as they mature.

In chicks and young juveniles, there is little difference between the sexes. Early sex determination is difficult, but can often be made by examining the sex organs. The penis of the cock is slightly larger than the hen's clitoris, although both are very similar in appearance. At about 9 months of age, sex determination becomes easy when the penis emerges during urination.

Chicks can be tattooed, branded, or microchipped at 1 day of age. The brand can be placed on the bare patch of the belly immediately behind the thigh. A thin wire can be formed into the identifying numerals or letters, heated red-hot and touched to the skin to create a permanent mark.

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