American Emu Association - Incubation & Hatching

The Mississippi Perspective by Mickie Burris

I’d like to start by saying that the enclosed information is merely an outline to assist you in the successful incubating and hatching of emu chicks. There are many variables that will affect the outcome but there are certain basics that when applied will generally provide positive results. I ask you to consider that my comments will be primarily from the “Mississippi” perspective, since that is where I live. It is my hope that you use this outline as a guide to assist in finding what works for you, your geographical location and your particular farming operation.

One of your best tools will be your fellow emu growers. Any good emu farmer will tell you that nothing is written in stone and that there are no dumb questions. More likely than not, any question you may ask has been asked by another grower or at least “wondered” about by another grower. There is no way I could have made it the first year or two without the assistance and advice from several fellow growers, as well as my faithful standby, Mara Minnar’s Emu Farmer’s Handbook, volumes I & II. In fact, I still refer to & use many of these basic principles.

Talk to as many farmers as you can, take notes, document everything and never be afraid to ask questions. Realize right up front that after the basics you will find what works for you, what you are comfortable with and what brings you the results you desire.

From this point on I will attempt to offer a summary of how we do things within our operation as well as include some tips from other farmers. Remember even if you do “everything right” during the incubation and hatching period, nothing and I do mean nothing will be as important as what happened ‘PRIOR’ to this time. Your breeders must be in proper shape and you must always follow good basic farming practices, before the breeding season, as well as, during. If that breeder is not in top shape there is no way it can produce the end results you are trying to reach.

Now we will move into some basics:

NATURAL HATCH (Using Breeders) - No more than 40%-50% of these will generally hatch / survive. There is a high mortality rate in chicks hatched in the wild.

EGG COLLECTION:

- **Tools:** Flashlight, Collection container (basket, bucket, etc), White china marking pencil, fabric marking pencil, masking tape or wax pencil, some folks use a paper towel to pick up the egg and to place over each egg going into the container, though this particular practice we do not use.
- **Egg Collection:** When the egg is collected, be sure to mark / identify the egg according to the breeder pair / pen it was collected from. If the egg is fresh (you see the hen actually lay or the egg is still “wet”) wait for it to dry before handling being careful not to disturb this coating.
- **Cleanliness:** Some say you cannot have too much. In our system, if the egg is laid on dry ground, in the grass or inside the shelter and is absent of mud or feces, we do NO cleaning (nature provides a protective coating on this egg cuticle that is superior to anything we can do, therefore we always try to leave that coating intact). If the egg is muddy or dirty we generally spray them with a solution consisting of 1 tsp Chlorox to 16 oz water then gently blot them clean being careful not to rub the dirty matter into the pores of the egg. Then we re-number the egg as to the breeder pair and order of egg laid for that pair.
  
  * **NOTE:** Eggs sprayed will be expected to loose 3% the first week as the moisture sprayed on the egg will potentially affect its initial weight and subsequent weight loss, though this is not always the case as slick and rough surfaces of the egg will also affect it (slick holding less moisture). Soiled eggs that have to be more vigorously cleaned have a potential for rotting due to the cuticle being disturbed. Sometimes this results in bacteria penetrating the egg, causing it to rot.

  - We keep charts for each breeder pair that contain columns for: order laid, date laid, ambient temperature, weather condition (sunny, raining), condition of egg (muddy, clean), time of day picked up (when laid or next morning) * we’ve actually had success even with eggs left out on freezing nights that hatched with no problem. This information proves beneficial as it provides insight down the road as to why you may have abnormal conditions with certain eggs (i.e., if the egg starts to rot, if it was dirty, frozen, etc.). If all eggs are from one pair then you know breeders could have a problem.

EGG INSPECTION: It is a good practice to thoroughly examine the egg when collected. We generally discard any eggs that are cracked, extremely muddy or suspicious looking. At the very least we recommend that you place those eggs in a separate incubator.
WEIGHING: Weekly weighing of eggs is highly recommended. In the past we have weighed daily, but have found over time that this was a bit too labor intensive and the results are about the same with weekly weighing. Why weigh the egg you might ask? This is the best way to tell what is going on inside the green shell. Another reason for “weekly” weighing compared to daily weighing is that each time the incubator is opened and the egg is handled, it stands a bit more chance of airborne bacteria entering. Though, I must admit, when using small GQF incubators that are filled to capacity, I like to open the door for a few seconds each day to allow fresh air into the incubator, as well as, release the carbon dioxide. Of course if you turn eggs twice daily this is accomplished at the same time, but, we will discuss that later.

STORAGE: Normally we store eggs between 45 degrees and 55 degrees (preferably between 50 and 60 degrees but, never over 60 degrees). If we are not going to store them, we generally allow the egg to come to incubator room temperature for 12 hours and then place it directly in the incubator. If stored, we take the eggs out of the refrigerator around 6 PM the afternoon before loading the incubator which is generally around 7:00 AM the next morning (12-13 hours before incubating). This allows the egg temperature to gradually rise as opposed to a 45 degree to 97 degree transfer difference which shocks the embryo as well as causing moisture to condense on the shell.

INCUBATION: We remove the trays and clean them as well as wiping down the inside of the incubators with a bleach-water solution both before and after incubation. It is always a good idea to check and do maintenance on your equipment prior to Incubation and Hatching Season. And, I highly recommend having additional parts on hand in case you are in the middle of incubating and have a heater, thermostat, etc., go out, unless of course you have another incubator that you can move the eggs to. We turn the incubators on approximately 2 days prior to loading them to make certain the temperature and humidity are stabilized before loading so that the thermostats and other inside materials such as egg trays can come up to proper temperature. We monitor the temperature and humidity with digital Probe Thermometers not the standard dial type that comes on a GQF or other small incubator. This probe is used at this point to check the temperature and humidity at each tray level to get your averages. Then, you will know what is happening in relation to the probe, air flow hole, and the rest of the incubator.

We attempt to hold the:

- Room temperature between 73 degrees and 76 degrees
- Incubator temperature between 96.8 degrees and 97.5 degrees (97 preferred)
- Incubator humidity between 27% and 34% (with 30% preferred)

Some egg shells are thicker than others thus requiring different amounts of humidity for optimum hatching rates. Very few eggs lose the same amount of weight each week. On average they should lose around 2% of original weight per week. Often an egg will lose 3% one week and 1% the next. We've hatched viable chicks from 12.5% to 17% over all weight loss.

If after 2 weeks of loosing the wrong amount of weight, you can “carefully” adjust the humidity in the incubator through either adding or removing water in the trays. Full tray is generally too much as air coming over tray of water picks up too much moisture thus, humidity rises too high in our humid, southern climate. Lower levels in the tray adds less moisture to incoming air. In our GQF incubators we normally do no more than ½ inch of water in the pan. Regardless, NEVER over adjust temperature or humidity during hatch. Gradually adjust them. Normally during the beginning and at the very end, we’ve found that the eggs tend to lose just a little more weight than in the middle of the cycle.

- If you stored your eggs in a low humidity condition (newer, frost free refrigerators with humidity controls) this can cause them to lose weight rapidly and when incubated will draw in moisture to compensate for the rapid loss and will therefore gain weight for a week or so.
- Taping eggs - If for some reason you can’t add enough water to keep the egg from losing weight too rapidly, we’ve had success with taping the egg. This lowers the surface area of the egg capable of losing moisture.
- Opening the incubator daily, for just 10-15 seconds helps the eggs get oxygen and allows you to get any telltale signs of rotten eggs. It doesn’t take long for a rotten egg to smell bad. If you don’t notice the normal sweet smell on your daily checks, sniff each egg carefully. You will find the culprit easily.
- Good airflow is just as important as cleanliness so there must be a balance. We rotate eggs 180 degrees morning and evening (Left in the morning - Right at Night). Don’t rotate the egg the same direction continuously as this may cause the embryo to develop abnormally.
- While no two eggs are the same, each breeder pair’s eggs may have similar characteristics (Rough porous surfaces and smooth slick surfaces) which allows them to basically be treated the same in the incubator. Therefore, we generally like to use several small incubators as opposed to one large incubator. This is NOT as convenient, but sometimes the easiest way is not the most productive.
As I mentioned earlier, we’ve hatched viable chicks with weight losses from 12.5% to 17%. In the past we’ve batch hatched in 3 GQF incubators (108 eggs at a time).

Our hens generally begin laying in October and usually takes 35 to 40 days to produce the 108 eggs with the number of breeders we’ve had in the past. The eggs were stored as gathered in an older refrigerator (NOT frost free) so, the humidity is not as low (approx 25%-30%) and 45 degrees to 55 degrees. We have hatched eggs that were stored up to 90 days, but 45 days storage seems to be where hatchability begins to fall off.

These eggs are turned 180 degrees twice daily (AM & PM). Never the full rotation.

* NOTE: the rotation is done to prevent the yolk from floating up and sticking to the shell or laying on the bottom and sticking to the shell.

Other Information That You Might Find Helpful:
GQF average range of Incubation Temperatures: 96.2-98.0 degrees but never above 98
Humidity: 30%

Nature Form: average Incubation Temperature: 97.0-98.0 degrees
Humidity: 29%-31%

Hatch Rite: average Incubation Temperature: 96.5 –98.0 degrees
Humidity: 30%

Phoenix: average Incubation Temperature: 97.0 – 98.0 degrees
Humidity: 30%

*A special thanks to two Mississippi Emu Association (MSEA) members for sharing the following information.*

**From the Breeder Pen to the Brooder Box Incubating and Hatching by: G.L. Welch, Braxton, MS**

First of all let's start by saying it is not as hard as it sounds. People tend to blow things up and make them more complicated than they actually are.

What we did as beginners and what we do now is a lot different. In 1990 when we started in the bird business, we were under so much pressure to get the chicks out we would tend to do too much. They were a lot more valuable, so we wanted to do our part. Needless to say we would have been better off keeping our hands out of it as we go from beginning to present. I will reference back as to how we done things then and how we do it now.

**Eggs**

In the beginning we started with one (1) pair of breeders. It was no problem identifying eggs or keeping track of weight loss, egg production, hatch rate, etc. We had sheds built for individual breeder pens with hay as nesting material. They didn't always lay in the hay, but we were always standing and waiting on the egg.

It is different now that we have around sixty (60) breeder pair. Now we run community pens instead of individual breeder pens. Gathering eggs in a four-acre pen is quite different from gathering in a 25’ x 75’ pen.

We try and gather eggs as early as possible especially when it's raining and muddy. This makes for a lot of walking and looking since all hens don't lay at the same time. Once eggs are collected, we clean and mark as needed. Cleaning in itself is another whole story. In the early days we used Tektrol as a cleaner, then, we went to Clorox water. Now we don't wash if they are anywhere near clean. The ones we do wash, we use tap water, wash cloth for rubbing dirty ones and pat dry with a paper towel to minimize moisture on the egg.

**Egg Storage**

During our first year, we started out picking eggs up one night and setting them the next. The second year we set all eggs the same night of the week (Thursday) so that our 49 days would be up on Thursday and we would have the weekend for egg hatching. This method also eliminated holding eggs laid on Thursday because we set them as soon as we gathered them. I have put eggs in the incubator within 10 minutes from the time that they were laid. We started noticing the eggs set on the same night they were laid hatched first and were the easiest chicks out. As far as long term storage, we have not tried this. I let a friend have some eggs that we had cleaned, but had left on a table unturned and room temperature. He was excited about the high hatch rate from these eggs that were 3-4 weeks old when he got them.
Incubation
We tried several different methods in marking eggs. We used different colored stickers that would dry out and come off in the incubator. The simplest method we found is a white quilting pencil. We feel the more info you put on the individual egg the less paperwork involved. Since we batch hatch, all you have to keep up with is by the tray or by the incubator. We simply mark the calendar as to what incubator and what trays we set on that date. We then mark the calendar 49 days from the set date to get a close day in which to move the eggs from incubator to hatcher.

Before we move on to hatching, we need to look at temperature, humidity and turning. As far as room temperature, we try to stay around 65 - 70 deg. F. We do this with a combination heal and A/C window unit. I believe in fresh air piped into the incubator room. I did not do any air exchange calculations. I just bought a 6” inline duct fan and installed a timer on it with a variable speed control. The timer is set to come on 20 minutes every hour. We also filter the air coming in. Temperature in the incubator is not as much a problem as we were told in the beginning. It was said 97.5 deg F or the eggs would not hatch. Power failure was a disaster if, there was no generator for backup.

We bought a factory incubator the first year we hatched. Trying to be conservative and pay as we go, we built our second incubator ourselves. My father-in-law, being a handy man with wood, built the cabinet for the incubator and I installed all the mechanical and electrical equipment myself. All parts were bought from WW Grainger catalog. The temperature control is + or -1 deg F. My set point is at 97 deg. It will fall to 94 or 95 deg with door open, but comes back rather quickly.

As for humidity, we started out weighing eggs and running a dehumidifier in the incubator room and adding water pans in the incubator. After ruining a lot of valuable eggs, we changed things up. Being located in Mississippi where we have high humidity, it makes a difference. Now, we don't add any water to the incubator. I feel with the fresh air added to the room we should be all right. I do monitor the room temperature and humidity but, I don't do anything about it. As far as the incubator, it doesn't have a humidity sensor.

We stopped weighing eggs. The first year we about wore them out weighing. After seeing how much trouble it was and not being able to do anything about it, we stopped. My wife and I still have full-time jobs, so having time is a problem. We have never run large eggs in one incubator and small in another.

Thunder and power failures go hand in hand around our house. We used to sweat it every time we heard thunder. We would run and gel the generator. For short power outages now we will open the incubator door so the eggs get plenty of air. I start the generator after a couple of hours of power failure. We believe the temperature change doesn't hurt the eggs as long as they get fresh air. As for rotation of the eggs, we set horizontal and rotate 90 deg every hour.

Hatching
We use the tapping method to check fertility. We have never used an egg candler. When we first started, it was hard to get all the sounds right. I made a small hammer out of stainless steel for lapping the eggs. You will have to train your ears for the different sounds. We used a wire antenna that would clip on the egg looking for movement, now we remove the eggs from incubator and watch. If the egg is fertile, you will see movement after a few minutes out of the warmth. We were told to use a stethoscope for listening to the chick, now we rely on our ears alone. You are able to hear the chirping of the chick, before he pips the shell, if he is in the air sac.

We believe nutrition for the breeder birds is a big factor in the hatching process. We free choice using our own high protein, high fat formula feed. We have probably tried most feeds on the market over the years. We had to go to bulk feed for several reasons. The sacks were about to kill us, let alone the money difference. When you have several hundred birds to feed it is hard to do from sack feed. We tried limiting the breeders to so many pounds per day based on what we were told they needed. Not only was this a lot of extra work, but we were starving the birds. Needless to say we went to free choice all the way from chicks to breeders. We don't hand feed anything in our operation except to keep feeders full for chicks.

Back to hatching at day 49
We started out moving all eggs at day 49, regardless. If the chick had not hatched by day 50, we would knock a small hole in the air sac end of the egg and keep enlarging every hour, or so, until the chick was out. Didn't take long for us to realize this was the wrong way to go. Now we leave them as long as we can in the incubator. We let them pip or at least be in the air sac before we move them. Some will hatch early in the incubator. We just move them to the hatcher for a couple of days and then to the brooder box.

Once in the, brooder box we put them on Dri-Dek for good traction. In the beginning, we would use rubber bands on all chicks, now we band only if we think they need the extra stability. We offer water all the time in the brooder box, but no feed. From brooder box they go to chick run and free choice starter feed.
The following information was provided by Peg Gardiner of Bamboo Emu, Meridian, MS in response to a questionnaire that was sent out.

Some info that would be beneficial:

**Type incubator used** (GQF, Humidaire, Kuni, etc.)
Hatchrite and Kuhl

**# eggs incubated per incubator.....# incubators per room.... room size .....**
Hatchrite 72 eggs Kuhl 54 eggs Room 12x15

**type climate control** (window a/c, central H & A, natural gas, propane, electric)
Window unit - heat and air

**Ideal Incubator temp**
We use 96.8

**Ideal Incubator Humidity**
30.2

**Outdoor climate (temp & humidity)**
With Mississippi, it is all over the place

**Room / Hatchery temp & humidity**
70 to 74 degrees (harder to control in the summer) 40-46% humidity
In winter we need to use a humidifier and in summer we use 2 dehumidifiers

**Egg storage: days___ temp stored____**
We have stored eggs up to two months with success and held at about 45-50 degrees in an old refrigerator