

# EGG PRODUCTION

*in a Regenerative Future*



*Robby and the pet Chinese Weeder goose baby*



A Koanga Booklet



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# INTRODUCTION

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My life seems to have become largely concerned with learning to future-proof our food supply (that of mine and my family's) and also sharing and leaving some models, some useful genetics and some thoughts and experience as potential guides for others as well.

For both our vegetables and our fruit, this has become a journey to save our NZ heritage food plants, which just so happens to also be the vegetables and fruit that not only have the potential nourish us best, but to be the genetics that perform best in living regenerative systems, capable of forming strong connections via the microbes and fungi to support resilience and strength and regeneration in every way.

It has also been an incredible journey of learning to design and live with regenerative ecologies that house the heritage veg and fruit... so we not only end up with food that is nourishing for us but also creates regeneration in the ecology in which it is grown.

Chickens, along with cows and other animals also happen to be a very important part of our food system (check out Weston A. Price's book *Nutrition and Physical Degeneration* to see just how important!). It is also clear that we can no longer produce eggs and chicken meat the way the industrial system currently does that, neither meat or milk. Meat and milk production could be the title of another booklet but this one is about the eggs.

We know that everything about the current chicken and egg system has to change.

We know that the genetic base of our industrial chicken is so narrow that even the two companies in the world that own those genetics (yes two companies own pretty much all of our industrial chicken genetics), are very worried about the fragility of the narrow base.

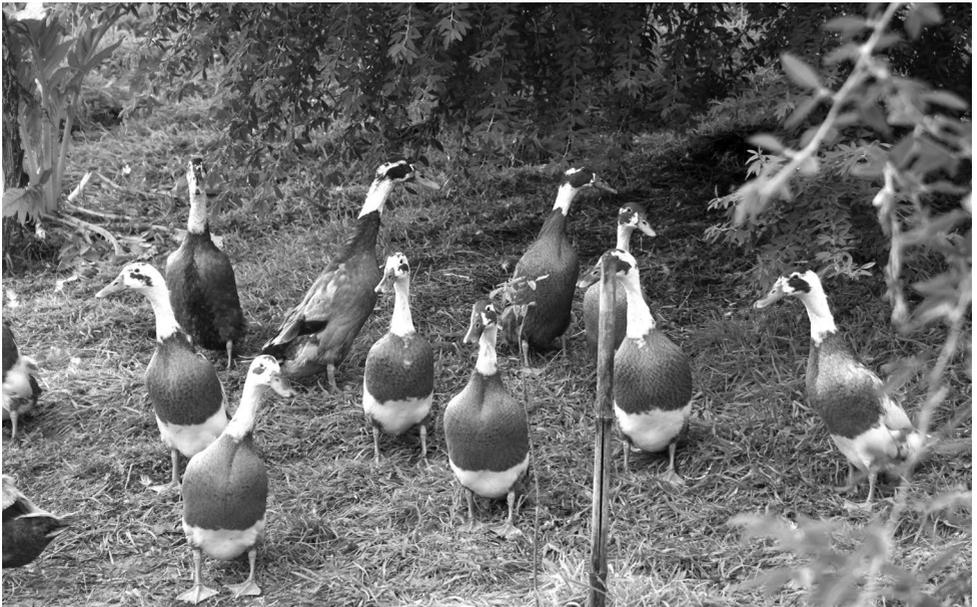
We also know that the way we feed our chickens (industrial grain production), is part of what is destroying our top soil along with the entire ecological system that co-evolved on and with that soil, the basis of all life on earth, and we also know that the way we house them and keep them alive is cruel (even in many of the 'free-range' branded eggs), and that the chicken farms create horrendous pollution.

We have an opportunity to make changes at this point, let's make them while we can!

It is an exciting and very satisfying journey. It doesn't come much better than being surrounded by and interacting with healthy, happy chickens each day, living in their environment, sharing an environment, in a way that regenerates that environment (they do lots of work for us) and in a way that does not destroy anybody else's environment (i.e. no industrial grains, fish from Asia etc.).

I set myself the challenge a couple of years ago to see if I could feed my chickens with NO industrial grain. I have been doing that for over 2 years now, no commercial food or any brought-in food at all. (Although as I write this booklet we decided to greatly enlarge our flock and focus on breeds that we believe will be the best for future production so we do have some organic whole maize as a backup when those food items produced by us are not enough). You'll see how I'm doing that in the following chapters.

I see now that we have to address the genetics as well. We need to have birds that are as best suited to laying eggs as efficiently as possible, in the environment or ecological niche that we can best provide for them wherever it is that we live.



Fawn and White Indian Runner ducks

Basically I'm asking 2 major questions:

- What could be some of the options for regenerative chicken management systems for us? Understanding there will be many, and it could be slightly different for all of us!
- Which are some of the best breeds we have now, for the job of producing eggs without industrial chicken food or breeds or conditions, and or how do we create the best breeds for our various situations?

Let's firstly begin by understanding a little more about chickens by checking out our *Egg Production in a Regenerative Future... Design Process* that we use when we teach our chicken workshops. That will give us a framework to begin to find a way forward.

1. Egg Production in a Regenerative Future... Design Process
2. Next I'll cover some of my ideas for egg production without industrial grains based on meeting the needs of the chickens as following good practice as per what we learned in Section 1. Obviously for most people it will be a process, getting your birds off industrial grains and the speed with which it might happen for you will depend on many things, i.e. the breed of birds you have, the resources available to you to establish other systems, your access to alternative food sources, how much land you have available etc.
  - a. Urban chickens
  - b. ¼ acre chickens
  - c. Behind the cows chickens
  - d. Poultry pig forage paddock chickens
3. By the time I had worked my way through designing and implementing all of the above in various ways, I came to the conclusion that I could very well be far better off doing some homework on breeds. I had always had Brown Leghorns, some of the best layers of the heritage breeds, but I began to feel that they actually were requiring a lot of food each day for the eggs and meat they produced and maybe there might be breeds that could do the job more efficiently... I started looking and talking to some of my mentors about this idea

# **SECTION 1 – DESIGN PROCESS**

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## **EGG PRODUCTION IN A REGENERATIVE FUTURE**

The following notes are those notes (slightly adapted to suit this context) that we use when teaching our one day Chicken Breeding and Management workshop. They follow the Permaculture Design Process, beginning with ethics, principles and patterns, to understanding the range of appropriate strategies and techniques, so that you can choose the best for your particular situation.

Getting your head around this information before continuing with the following sections will help you build a picture of the kind of information that we need before trying to decide what our best solutions for regenerative egg production might be.

If you haven't actually spent a lot of time living with chickens there could be some surprises and if our goals are to find the best breeds for us, or breed them, and choose the best way to feed and keep them then we need to know all of this.

## **PURPOSE AND CONTEXT**

The purpose of this booklet is to begin to understand how we can design and build regenerative ecologies to feed chickens for egg production, and which breeds might be the best ones for us to work with or even breed our own breeds with.

## **ETHICS AND VALUES**

i.e. Things we value, in relation to eggs and chickens:

- Integrated permaculture design
- Holistic management
- Regenerative soil management
- Comprehensive balanced nutrients for plants and birds
- Nurturing environment for birds and farm workers
- High quality eggs
- Use of on-farm energy
- On site food production for as little energy output as possible

## PRINCIPLES

Things we understand are principles of science, laws of nature around chickens:

- Chooks are omnivores, not exclusive grain feeders.
- Chickens require a low fibre, high protein diet to lay well.
- Principles of Biological Ionization (A. F. Beddoe, *Nourishment Home Grown: How To Grow Real Nutritious Foods In Your Back Yard*), i.e. how a healthy cell grows.
- High brix food is required for good nutrition of chooks and people.
- Environmental needs of reliable laying hens include optimum water, warmth, shelter nutrition and light.
- Human nutrition requires optimum nutrients (vitamins, fats, omega 3 omega 6 (1:1) etc.).
- Environment determines genetic expression, from the new science of Epigenetics.
- Breeding. If you select for one characteristic you change them all.
- Co-evolution. We acknowledge relationships between chickens and the ecology we provide them with, they will affect each other.
- Best possible birds may be those we let co-evolve in our own ecology, with selection constantly of those that perform best in every way.
- Principles of line breeding, must have wide enough genetics and be able to choose from wide enough base each year

## PATTERNS (RECURRING CHARACTERISTICS)

### *Feeding and Nutrition*

- Chickens have co-evolved on the forest edge, where all their nutritional needs are met, greens and seed from grass and herbs, forest litter, microbes and bugs everywhere.
- Grain production is energy intensive, and in the industrial system a destroyer of soil and ecosystems.

- Perennial and wild crops recycle a wider range of nutrients than annual crops.
- Self-feed sources require less work by us.
- Chooks will self-select food according to their needs/desires.
- The higher quality food they are receiving, the shorter the moult, in relation to the breed.
- Full and dark red combs indicate a highly mineralized chicken that is laying.
- Comfrey is low fibre and is able to provide 60% of a chickens protein needs.
- Wild birds (sparrows, turkeys, minors) and rats will eat a large percentage of the chickens feed if given the opportunity. Don't feed on the ground unless protected.
- Chickens need unlimited access to clean water.
- Poultry given humates/biochar in water/food will utilise their food more efficiently.
- Laying hens need high levels of live protein to lay a lot of eggs.
- In traditional societies Weston A. Price found eggs were regarded as sacred food.

### *Behavioural and Genetic Patterns*

- Chickens have to be kept out of gardens.
- Chickens hide their eggs.
- Chickens always have a moulting period in late summer/autumn.
- Chickens need full light to lay well.
- Chickens can be happy in far smaller areas than ducks.
- Chickens need to be able to scratch.
- Bossy hens get the most food if feed troughs or access is not designed well.
- Chickens bred in, and coming out of, industrial systems may not do well in a regenerative system.

- Chickens provide mineral-rich manure, phosphate and nitrates in particular.
- Chickens hatched in October will come onto the lay before winter, hatched later will not.
- Ducks need wide area of high quality pasture and wetlands to remain happy and laying without being fed.
- Chickens lay more eggs in their first season than following years.
- Some breeds lay for many years longer than others.
- Chickens can reach high in the orchard to pick fruit and even get up into trees.
- With wings clipped, sometimes possible to get into low branches and fruit.
- Light breeds require higher fencing than heavy breeds.
- The best chickens are raised from two year old, or older hens.
- One rooster is required for every 6-8 hens.
- Eight hens and two roosters is a minimum sized flock if maintaining the breed for the long haul is to be achieved.
- To maintain a strong line through line breeding with chickens around 80 chickens need to be hatched, from a minimum of eight hens and the best two roosters chosen each year and the best four hens to replace half the laying flock.

### *Breed Patterns*

- Be aware that choosing your birds because of name of breed is not enough. You need to get them from a breeder that has bred for egg production as well as breed standards, as well as bred to do well in the soil climate and management system you will provide for them.
- Some breeds are better mothers than others.
- Some breeds go clucky, some don't.
- Different breeds have different characteristics regarding management, outputs and productivity e.g.:

*Heavy breeds generally:*

- \* Lay brown eggs.
- \* Are more relaxed.
- \* Are better around children and strangers.
- \* Lay less eggs.
- \* Are more likely to go clucky.
- \* Are usually easier to keep behind a fence.

*Light breeds generally:*

- \* Lay more eggs.
- \* Lay white eggs.
- \* Are more flighty and sensitive to noise.
- \* Are less likely to go clucky.
- \* Are less likely to lay through winter.
- \* Are often harder to keep behind a normal farm height fence.
- Different breeds do best in the ecological niche they evolved in, i.e. some do best on heavy soils, some on light, ducks in wet.
- Light breeds are usually the best Spring/Summer layers.
- Heavy breeds are usually the best Winter layers. Some bantams may be the best all year round layers (Araucana).
- The best chickens are raised from two year old, or older hens.
- One rooster is required for every 6-8 hens.
- Eight hens and two roosters is a minimum sized flock if maintaining the breed for the long haul is to be achieved.
- We need to breed for improved production.

- Industrial egg producers lay at 16 weeks old, laying more than 300 eggs per year, but narrowly in a defined production system, often involving unsanitary conditions, wasteful, polluting the environment and wider area, destructive of agricultural soils where their grain is produced. The chickens require higher inputs of protein to fuel high levels of performance, and a steady diet of interventionist medication.
- Most heritage/exhibition breeders focus on fine points of colour, pattern, comb and carriage, as opposed to production traits.
- Hatchery birds are bred in a production environment far removed from conditions of a working homestead flock.
- Past decades have seen relentless consolidation and centralization, within the hatchery industry, that means fewer individuals are involved all the time making decisions about how poultry stock is bred.
- No-one is breeding to your specific soil and climate conditions using your management systems or with your goals.
- It's no accident that Old English game has a 1000 year old history of being valued as utilitarian farm fowl.
- In changed circumstances productivity of this bird would become apparent.
- Traits such as rate of growth, disease resistance, early onset of lay, fertility and hatch rate are controlled by interrelated sets of genes.
- If you mate best to best with no further refinement this may prove more a recipe for decline in productive traits.
- Mating brothers to sisters leads to inbreeding depression.
- Large egg size highly heritable.
- Both rate of growth and mature size are key production factors. The two traits above are not always positively correlated.
- Certain traits related to high egg production can only be determined through hand selection. For example, the space between public bones, distance between public bones and tip of keel, soft pliable abdomen and other structural indicators of internal capacity of ovaries and other reproductive organs.

- Hens who wait until later in the fall or early winter to begin moulting are generally those who have laid the best through the laying season.
- Those who moult quickly and get back into laying will produce more eggs in a year's time.
- Nest trapping enables more targeted selection of higher laying breeders.
- If maintenance of winter production is important, tracking of laying in winter by individual hens is necessary.
- Remember males transmit egg production traits as well, to their daughters.
- Certain structural characteristics are necessary to realise a bird's potential for production of eggs and meat. Heart girth, flatness, length and breadth of back, depth of body, straightness and length of keel, all are related to allowance of room for large digestive system enhanced capacity for growth.
- Width of skull related to productive capacity.
- Birds with wider feathers tend to grow faster.
- Wider feathers retain body heat better than feathers so more energy from birds food is available for growth.
- Breeding for more self-reliant farm and homestead flocks means selecting for high levels of foraging skills.
- Selecting for temperament ensures birds will be pleasant to work with in future generations.
- Classifying breeding into two roles, improvement breeding and conservation breeding is critical for achieving your breeding goals.
- Improvement breeding is guided by two concepts, offsetting faults and emphasizing good traits.
- Conservation breeding has to do with maintenance of genetic diversity by maintaining all available blood lines or families, and using breeding systems that minimize inbreeding.

- On a homestead featuring small numbers of breeders one might mate flock as one unit using males for only one season using their sons the next season and bringing in new males every two or three years to reduce inbreeding.
- Rolling Mating, pullets are mated to old cocks, and hens are mated to young cockerels each year. This requires two breeding flocks for part of the year.
- Spiral Mating three or more families are set up each with unique identification used to identify that family, i.e. colour bands and toe punching.
- Selecting for and against the broody trait depending on your goals.

### *Health and Safety*

- Chicks hatched and reared in an environment high in healthy microbes will grow faster and healthier.
- Chicken flocks can be devastated by ferrets, stoats and weasels.
- Hawks frequently attack chickens and full size hens, trees within close range help protect them.
- Chickens fed whole grains and sprouted grains and or other natural food do not get intestinal worms.
- Chickens that are fed pellets often get intestinal worms.
- Chickens are susceptible to getting scaly leg and lice.
- All water fowl require enough water to swim in and wash their feathers out, as chickens use dust bath. High fertility is dependent on water being available to maintain their health.

### **STRATEGIES**

- Choose breeds that have actually been bred to lay very well on a nutrient dense, non-industrial diet, that are good foragers, and are capable of finding their own food when it is there.
- Buy from the best breeders, fertile eggs or day old chicks, or pullets or roosters, or even old birds and roosters that are no longer needed but the best breeding stock from a previous year.

- If looking for egg production choose light bodied breeds, that have been raised for egg production rather than conformation and feather colour.
- If you hatch your replacements early each Spring your birds will begin laying in May and lay through the winter their first year. Choose carefully if you want a breed that goes clucky as well as laying eggs.
- Possibly choose a few hens just for their ability to go clucky and hatch your replacement hens and roosters.
- Build a house using local materials that keeps the chicken in full light, sheltered and warm.
- Build a house that has a scratch yard, that is kept covered and dry/moist so that it grows lots of insects, microbes and fungi, and chickens can be feeding and scratching whilst shut in for egg collection.
- Place a diatomaceous earth or wood ash (or mix them) bath in chickens scratch yard.
- Build a house that keeps out predators.
- Build a house that is designed to make it easy to lime wash the walls and roosts to keep off lice.
- Sprout whole grains.
- Nixtamalise corn.
- Seaweed supplement.
- Place a net inside scratch yard where you can place greens, so they don't trample it and spoil it.
- Plant comfrey around outside of scratch yard, so it grows through the netting, so they self feed (if permanently in a scratch yard).
- Design a diet based largely on live protein plus free range, if you want lots of eggs.
- Design for a diverse range of protein producing feeds.

- Maximize insect population growth by designing a forage system that creates food and environment for insects (forest gardens designed to have lots of chop and drop and lots of ramial size wood chip. The more decomposing carbon, the more insects and fungi).
- Find a feeding system that keeps the wild birds out.
- Measure egg production, in your own environment, as a basis for genetic selection.
- Ensure clean water daily.
- Always feed chickens in a container of some sort, that gives equal access to all chickens.
- Selectively breed for your own conditions and ecology.
- Develop skills of observation.

### *Breeding Strategies*

- It is better to choose breeders with a good balance of such traits, in preference to focusing on single traits alone.
- Important to eliminate as a breeder any bird with weak immune system.
- Critical to maximize genetic diversity among offspring.
- Maintaining genetic diversity is at least as important as selecting the best breeders, since only genetic diversity will keep the breed resilient and capable of evolving with changed circumstances.
- High culling rates are key to selection.
- Use top 10% to serve as breeders.
- Use Top 5% of cocks, since fewer cocks are needed for breeding.
- Top 20% of pullets.
- While selecting breeders for size and rate of growth don't choose birds who are super/inordinately fast growing, and much larger than their peers, these birds often have a tendency towards immune system weakness.

- Selection of breeders followed by selection of eggs.
- Don't set eggs of odd shape or surface texture (ridged lop sided or chalky shell, calcium bumps) these traits highly heritable.
- In early stages breeding should focus on improved production traits, e.g. early maturity, heaviest mature bird, the most eggs laid when you want them to be laid, going clucky only once and early in the season.
- Once productivity is making good progress secondary traits such as desired feather and egg shell colour can be selected for as well.
- Minimum standards for retention for breeding should become more stringent each year.
- Track both rate of growth and mature size at weeks 8 and 16 and prior to selection of breeding stock.
- Cull for such obvious defects as crooked keel, crossed beak, or malformed feet any time.
- Use your hands to judge the space between public bones, distance between public bones and tip of keel, soft pliable abdomen, and other structural indicators of internal capacity of ovaries and other reproductive organs, in order to decide the value of each bird for breeding potential.
- Cocks should be hand checked using same conformation criteria used for hens, as above.
- Watch for birds with wide skulls and wide feathers.
- When choosing breeding stock watch for hens that moult late and fast.
- Select for foraging skills.
- Always select for temperament.

## SOME POSSIBLE TECHNIQUES

- Choose Brown/White Leghorns, Andalusians, Black Minorca, or Legbars for maximum total egg production.
- Possibly choose Campines, and Sicilian Buttercups, Araucana and Old English Game who are possible contenders for maximum egg production with as little inputs as possible (Ken Vincent's opinion after a life time breeding and judging most breeds of chickens).
- Check out chart on page 50 to discover which breeds might have the qualities you are looking for in New Zealand.
- Develop a soldier fly farm to provide soldier fly larvae to feed chickens, fed with comfrey, rabbit manure, chicken manure, kitchen scraps, egg shells, pigeon loft manure, grass clippings, waste garden produce, adding lime.
- Grow worms for chicken feed, using in situ inputs, e.g. comfrey kitchen scraps, animal manure, possibly soldier fly farm substrate, (perfect for worms), adding lime.
- Have a maggot bucket system that provides fresh maggots on a daily basis through as much of the year as possible, fed with road kill, or any poultry offal etc.
- Plant a comfrey patch large enough to provide 60% of chicken daily protein requirements, chop up in chick's feed to get them used to it.
- Plant an alfalfa patch, high quality feed, my best chickens ever were raised on alfalfa, comfrey and curds.
- If you have free draining soil, plant alfalfa patch, and chop up in chick's feed until they eat it themselves.
- Ensure loads of ramial wood chip or chop and drop material (carbon deep on forest garden floor providing habitat for insects and bugs of all kinds). The more carbon, the more life, all of it is chicken food.
- Chop up tagasaste leaves in chick's food to train them to eat those (high protein and balanced minerals).
- Feed chickens 'chicken minerals' if food is not high brix.

- Add iodine to water, add molasses in winter, add humates or biochar dust to water.
- Design water container so it can not be contaminated by manure, and can not be tipped over.
- Recycle egg shells.
- Feed chickens 3% of their food as biochar.
- Run your chickens behind cows.
- Sprout or ferment whole grains.
- Nixtamalise corn.
- Seaweed supplement.
- Place a net inside scratch yard where you can place greens, so they don't trample it and spoil it.
- Plant comfrey around outside of scratch yard, so it grows through the netting, so they self feed, (if permanently in a scratch yard).



Young Golden Campine pullet and rooster

## SECTION 2 – MANAGEMENT SYSTEMS FOR REGENERATIVE EGG PRODUCTION

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### DESIGNING EGGS WITHOUT INDUSTRIAL GRAINS

It's obvious it's easy enough to feed chickens/ducks in a way that keeps them alive... we can all do that. It's easy enough to even let a hen go clucky and raise your replacements. If you're willing to buy shaver chickens and commercial feed it's even easy enough to keep them laying for a few months of the year, even quite a few months. With a little more luck or skill some are even able to keep their chickens laying for even longer. It is my experience however that managing heritage chickens for the long haul, so that you get maximum eggs, and or a good meat bird, as well as replacements of such a standard that we actually keep a breed strong and healthy through the generations, is quite another matter... and doing it without industrial chicken feed is another matter again.

I'm not interested in chickens as pets, or as a bird that I need to feed with industrial grain. I'm making a serious attempt to provide myself and others with nutrient dense food and find a regenerative way of doing things.

I've never seen any research on this but I do know that heritage seeds contain far more potential to nourish us than hybrid seeds, and I know there is an inverse relationship in our food plants between production and nutrition. I feel that will be true as well in our animals. Our ancestors bred them for far more than production. I believe we need to begin to breed new lines of birds from the best of the old lines and adapt them to eating what we can provide in our own environments.

I see a time in the very near future when grain will cost far more than it does today and when many more will not be able to afford to buy it. Those who can afford it, may be challenged by the choice, given the destruction of our earth's ecosystems industrial grain production creates? (See *The Vegetarian Myth* by Lierre Keith).

I also understand that chickens are omnivores, and did not co-evolve with industrial grain, or even much grain at all. They co-evolved in forest garden situations in Asia where they could endlessly scratch away in a deep litter situation and live off the bugs, grubs, green shoots, microbes, fungi and seeds

that were there and I'm sure in late summer/autumn there would have been significant amounts of grain to be found amongst the grasses on the forest edge.

Most of us have not been giving our animals, cows or chickens, sheep etc. a very wide choice, but when you do it is profoundly interesting to be able to begin to see through their eyes, why they choose what they choose to eat!

There is a growing awareness that all animals are constantly on the look out for food that will create the mineral range and balance that they intuitively know they need to be in top condition!

It has always been obvious that there has to be another way of feeding chickens and at the same time achieving moderately high egg production (so long as you have a chicken selected/bred for high egg production). There are many heritage breeds of chickens that are purported to be able to lay a certain number of eggs each year, but few of them do. I'm going to ignore the question of genetics and breeding until the next chapter and stick with the feed issue here. I'm assuming we have chosen a breed for egg production and we now want to be able to feed them with minimum grains and achieve the highest possible egg production, e.g. over 250 eggs a year.

We always had heritage breeds of chickens, and we always kept them under a free range organic regime, and I was always looking for better ways of feeding them. My first clues came from the old poultry breeders we knew in Northland, the guys who were the show judges, the guys who had been breeding and managing chickens their whole lives, and were more passionate about chickens than I could ever have imagined! We were fortunate enough to have several of them in our lives and they were quite clear about a few things. Number one was do not use pellets, use only whole grains, and always free range.

Viv Purdon told us that feeding chickens whole grains means they don't get parasites among other things so that is what we always did.

Ken Vincent always milked a cow and soaked his grain in milk, he swore by that and that also seemed like a great idea. The more feed from the farm the better. That was our regime for many years... whole grains soaked in milk, free range (never put chickens on a bare earth mud yard) and loads of comfrey. Later we learned about sprouting the grain and we did that for many years as well, but now we usually simply ferment any grain that we feed them, such as our own corn.

It was never radical enough for me though, I wanted off the industrial treadmill.

I have always poured over chicken books, every organic chicken book especially. They often have beautiful pictures and great info about housing, breeds, management etc., but when it comes to feeding they either seem to go way over the top with tables about feed and nutrition that the average home flockster or chicken lover can not relate to at all, or they basically ignore the subject. They mostly end up saying the industry knows best, just buy commercial feed.

I recently discovered a book written around 1923 (it has no publishing date but has a table of information saying they are 1923 figures) called *Ward, Lock & CO.'s Poultry Book* by Dr Harry Roberts. It goes way back before all those scientific tables showing just what an industrial system thinks chickens need to eat, and back to the basics of chicken patterns... from observation.

He says early in the book, 'Birds in a natural state will by instinct manage to secure the right proportion of the necessary constituents for their needs, and those fowls having a fair amount of liberty to range about for their living will be found to obtain in the way of slugs, insects, worms, grasses, seeds, lime and other minerals, enough food to keep them in perfectly normal condition. What we ask of them, however is something more than normality. We wish to encourage the bird's productiveness of eggs, or to increase their capacity to put on flesh. It therefore becomes necessary to supplement with food calculated to have the desired effect.' In his words, 'The foods most necessary for adult layers are those containing the constituents necessary to the production of eggs.' Which he says are 'nitrogenous substances and proteins' and so if we want to achieve high egg production without industrial feed, we must focus on a system that provides the ingredients that make eggs best... raw live protein!

The *Small Scale Poultry Flock* by Harvey Ussery is the most recent chicken book on the market and I'm so excited to be able to say that it is the best poultry book I've ever seen. The most exciting thing about that book is that he squarely faces the question, *how do we feed our chickens without industrial grains* and how do we do it in a regenerative way from our own land? He comes up with some great ideas. Not many of them were totally new to me but the fact that he is actually doing it very successfully himself and that he has put all the ideas together and added some that were new to me has been inspiring.

The best part for me was the section describing the Vermont Compost Company's operation where they use chickens to do much of their work. They turn food scraps from restaurants, together with dairy effluent and hay, into high quality compost for sale using chickens to do that work. As a by product, of this operation they receive large numbers of eggs, and the chickens eat only the residual food scraps (less than 10% of what goes into the compost so not much of that) and the 'recomposer' organisms (earth worms, pill bugs, millipedes, crickets, slugs and snails, ground beetles, spiders and fungi whose rhizomorphs chickens love, pupae of insect species, and at the microscopic level thousands of species of bacteria, protozoa, yeasts, actinomycetes, and more) as the heaps become biologically active.

## **GETTING YOUR CHICKENS OFF INDUSTRIAL GRAINS**

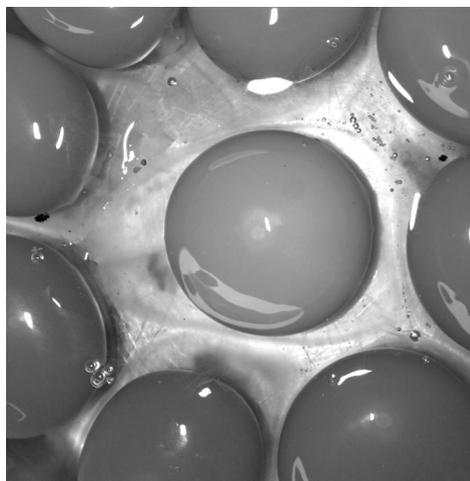
We made a commitment a few years ago to get ourselves (our chickens really, we already are) off industrial grains. We have been feeding the baby chickens chopped comfrey, mixed with chicken minerals (the fastest and easiest way to produce high Brix eggs while you get your pasture and chicken food up to scratch) and milk curds from the cows, with minced wild bill goat.

Chickens, like most other animals are creatures of habit, what you fed them when they are young, they will always prefer. Comfrey and curds are high protein in a form the chickens can digest, and that same mix has been fed to the laying hens as well. All of them are free range as well. We have in the last few weeks set up scratch yards for them, where they make compost. The idea is that they get a significant amount of their food from the decomposing material or more accurately the microbes, insects, decomposers (called 'recomposers' by Harvey Ussery), and fungi that live in the compost heap. This process takes a while to get happening, as a biologically active compost heap in a chicken pen, based on using leaves as the carbon source because it's easy for the chickens to scratch and turn over, takes time to begin decomposing and become biologically active.

We also have a place in our chicken forage paddock that is far enough away from our house and that of others that we can also use maggot buckets to feed the chickens. We have a large plastic vege crate up on wooden stilts. The vege crate has slits in its sides. We throw whole possums and bones with meat on from the butchery or goat paunch in there or several of them, and the maggots drop through and the chickens go nuts on them.

High protein is critical for high egg production. Chickens are very selective eaters when given a chance and providing them with such a range of protein sources can only mean they will get their nutritional needs met better and better without industrial grain. It's a buzz to see how easy it can all be, it just takes a little more time. Grains make things very quick and easy. As a global community, we are now facing the results of industrial grain production (check out *The Vegetarian Myth* by Keith Lierre) and it is way past time we found alternative regenerative solutions. I'm excited about being able to breed and select chickens for both growth and egg production based on a non-industrial, regenerative system.

It's really important to keep your chickens free of lice as well. Lice-ridden chickens will not lay as well, nor be as healthy. You can make a dust bath and add some diatomaceous earth as well as some sand and wood ash, a non-toxic, naturally occurring product, high in silica, to keep your chickens lice free for the summer. You get a 20 litre plastic container, cut it in half, nail it to a board, so the chooks can't flip it over when they stand on the edge. Mix ½ kg of diatomaceous earth with an equal amount of sand; they'll use this as their bath and absolutely love it. Use this method as a preventative measure; if your chickens are already badly infected, then you can dust their wings directly – just make sure to wear a mask, as the fine dust is not good to breath in directly. A 1kg bag should last you for the entire season.



Deep orange yolks of the free range  
Indian Runner ducks



A Brown Leghorn chicken waiting for  
the maggots to drop

# KOANGA URBAN CHICKENS 101

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So keeping in mind everything in Section 1 of this booklet about chickens, can we design a chicken system that will meet their needs and ours on a small site? I believe we can with some thought and planning. The most important thing is that you cannot keep chickens shut in without giving them deep litter to be scratching over all day. If chickens have a deep litter to scratch, they are happy chickens. Obviously shelter, a balanced high-protein diet, aerobic conditions, attention and connection are very important too. Because the rooster is not able to do all of the balanced food finding for his girls, not only must we do that for him to a certain extent but we must also maintain a good relationship with the rooster. See page 9 for chicken behaviour.

We have been trialling this urban garden chicken system for a few years now, and if we pay attention and do a good job it works well.

Obviously we are not only ending up with happy chickens but also lots of eggs and lots of compost capable of growing high quality food. In a 200sqm garden we have found that the chickens (with above numbers) produce more compost than can be used in that garden, even being very generous with it. We used the extra to grow fruit trees and bushes grown from cuttings in our urban garden to sell at the gate, getting an income from the compost as well.

We have one rooster and eight chickens (we are trialling Araucana and they seem to be outstanding in this situation, see chart on page 50) in a deep litter scratch yard of 2.4m x 2.8m, with a fully covered roof and chicken mesh walls, holding up to 50cm deep aerobic carbon/compost materials being turned by chickens.

They have several roosts at varying heights over the compost, a solid south wall behind them, two nesting boxes, and a dust bath with wood ash and sand inside, and a net for greens a container they cannot tip over of oyster grit or lime, fresh water, and chicken minerals and seaweed meal.

## URBAN CHICKEN FEED IDEAS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Comfrey	█	█	█	█	█					█	█	█
Wild early Spring weeds						█	█	█	█	█	█	
Worms				█	█	█	█	█	█	█	█	
Soldier fly larvae	█	█	█	█	█	█	█	█	█	█	█	█
Kitchen scraps, especially grains and meats dairy	█	█	█	█	█	█	█	█	█	█	█	█
Compost microbes	█	█	█	█	█	█	█	█	█	█	█	█
Moths and flies insects etc. caught by light or traps	█	█	█	█	█	█	█	█	█	█	█	█
Plantain, alfalfa, seasonal weeds	█	█	█	█	█	█	█	█	█	█	█	█
Tagasaste leaves and flowers												
Oyster shell grit or lime	█	█	█	█	█	█	█	█	█	█	█	█
Seaweed meal	█	█	█	█	█	█	█	█	█	█	█	█

Our medium/long-term goal is to be able to feed the chickens wholly on that food in the chart above, i.e. decomposers in compost, soldier fly larvae from soldier fly farm, and worms from worm farm, insects flies and bugs we can catch on site, plus kitchen scraps including meat, dairy and grains, greens, such as chicory in winter (mineral accumulator) comfrey from September to May (also mineral accumulator), plus alfalfa (mineral accumulator), plus French sorrel (mineral accumulator) and many other greens growing in forest garden surrounding 40sqm bio-intensive beds. It will be easy to have the chickens survive and be healthy and happy in this situation but it is only if we feed them enough high quality protein that they will lay well. My experience is that it requires somebody or possibly more than one person to really be connected to urban garden chickens and to become very sensitive to their requirements and how they are for them to lay well over a long period, it will not happen if you just open the door and throw in comfrey and ensure their corn is topped up etc. They need good observation and connection time, something to partly replace the role of the rooster on free range situations where he is constantly looking for the best food options for his girls.

It may take a few months before achieving desired levels of decomposers in compost heap plus a compost that can easily be turned by chickens. It will need experimenting to get the right size carbon in there, looks as though a chipper/mulcher to mulch willow, poplar or alders will provide best possible carbon, ramial wood chip.

A key part of getting this to work will be getting the minerals in the compost balanced, without achieving this, not only will the compost not work for us but the decomposers will not be there to feed the chickens! So long as we are using ramial wood chip, i.e. small branches, bark and leaves from the above trees, and adding calcium we should be right with the minerals, but we will test over time to check this.

We know from our previous testing that this compost without added minerals is far too low in calcium (and the available calcium magnesium balance is out) to be attracting decomposers. We must add calcium. Without the calcium it will not be useful on the garden beds either.

Our testing also shows that poultry manure is great source of phosphate, the other major weak link for our soils, so potentially this is an excellent way to make compost for the veg garden.

## CHICKEN MANAGEMENT

### *Daily*

1. First thing in the morning check chickens water, clean as often as necessary to keep clear and fresh... preferably install a water feeder that is automatic and can't get polluted, clean water is essential for egg production and healthy birds.
2. Next check that the seaweed meal, oyster grit and chicken minerals are clean and being eaten each day.
3. Run your eye over each chicken to see that they are active and bright eyed, and red combed... the bigger and redder the comb the healthier they are and the more likely to be laying. When their bodies become demineralised because of the egg production and lack of high quality food their combs go dull and small... they need remineralising! Are their feathers sharp and clean and shiny glossy and without damage? Check for lice occasionally. Observation is key to being an animal friend. Talk to them! Learn to identify all of them individually.
4. Put a bunch of greens into the greens net every day, even twice a day, in Summer lots of comfrey from urban garden, and wild harvested weeds and herbs plus as much dark green mineral accumulators as possible, including grass, clover, chicory, sorrel, grass clippings, plantain, tagasaste, and dock. The key thing is to give them as much as they can eat and no more, we already have high levels of nitrogen in the compost (chicken manure), the challenge is to bring in enough carbon, adding extra greens makes that challenge harder. If we have them, a handful of worms at this point too from the worm farm.
5. Collect eggs at afternoon feeding.
6. Watch for any birds that might still be sitting on the nesting box, and wanting to go broody. Do you want a broody chicken? Araucana as well a Golden Campine and Sicilian Buttercups will probably all go broody once in a season so be prepared. Have somewhere to put them and eggs ready to put them on for hatching or if you don't want babies then constantly remove your broody from the nest and possibly put her in a trap cage that gets full light for a couple of days to keep her from sitting in the dark.

7. In afternoon approx. two hours before roosting time, feed them soldier fly larvae, or whatever your key protein source is, enough so that they can eat as much as they want before roosting. Or if not available, then give them fermented grain. Fermented grain, wheat or corn contains maximum nutrition and is the most efficient cost effective way to use whole organic grain that costs money. If you have a chicken house that rats or birds can get into then I strongly suggest you only ever feed your birds in a grandpa's feeder. These feeders keep out both rats and birds and all kinds of issues created by rats and birds, as well as keeping chicken feed costs way down. If you have sparrows free ranging on your fermented corn they will eat a lot!
8. Ensure all inputs and outputs recorded on appropriate sheet.

P.S. Chickens must roost at night with a full crop if they are to lay an egg the next day.

### *Weekly*

1. On a weekly basis check and fill if necessary the dust bath (sand and wood ash/diatomaceous earth).
2. Add ½ kg of lime calcium carbonate or Environmental Fertilisers Nano Cal to chicken compost.
3. Check out the compost and chicken environment to decide if anything needs attention. The compost should be sweet smelling and dry, certainly not wet and sour smelling. It is essential to have a roof over the litter, and regular lime to create this situation. If they can't turn the material on the floor it will not work either!

### *Monthly*

1. Learn to pick chickens up to do a monthly check on health etc., instructions in Harvest Ussery's book.
2. Put tree paste on their legs to prevent scaly leg.
3. If lice under feathers dust with diatomaceous earth.
4. Add biochar to the compost in the chicken pen if you have it. It aids the chickens digestive systems plus works to build humus in the compost and stable carbon for the garden beds.

5. Lime their roosts, and the nesting box to keep lice away from the birds at night.
6. Ensure hay is fresh and clean in egg boxes.
7. Look at the compost and decide if any needs removing because it is ready to use. Better to use it before it turns back into soil and all the valuable interactions have taken place (see the Koanga *The Art of Composting* booklet).

### *Annual*

1. Ensure you hatch replacements every couple of years to maintain a breed, from the best layers and the best eggs of your own chickens. See Section 3.



Araucana in the urban garden

# FEEDING CHICKENS IN HOME-SCALE FOREST GARDENS

---

I have just achieved something I dreamed of in my chicken feeding system. My chickens are now eating the leaves of tagasaste when I break or cut them down for them. All it took was offering them tagasaste first before anything else each morning, before letting them out of the chicken house. It took three days and they were eating it just as though it was the comfrey or alfalfa they also love.

Tagasaste is an amazing animal food (see *Tagasaste* by Laurence C. Snook), it contains around 20-30% higher protein than alfalfa, and levels similar to alfalfa for minerals such as calcium and Phosphorous. It is high protein, low fibre, just what chickens need. Same as comfrey!

The greatest thing about it is that it has beautiful fresh growth all winter when the alfalfa and comfrey are not growing!

We had chickens before planting the forest garden so we mulched every new tree with river stones to protect their roots. That worked well, we lost none.

While we are getting our forage systems established we fed our poultry mainly curds, chicken minerals and comfrey. We have now added alfalfa and tagasaste. These three greens are all very low fibre, high protein feeds, which is what chickens require to lay eggs well.

We designed our forest garden with egg production as a top priority, many of the support species provide chicken food (see the chart on page 38 And the Koanga *Design Your Own Forest Garden* booklet).

As the forest garden has developed the chickens are obviously getting more and more live protein in the form of insects, and we are beginning to get a feel for which flowers, seeds and berries they like and when they fall.

We know now that the first seed to drop is the Siberian Pea tree and it drops in December, copious amounts of small high protein seed from trees 10 years old and over. Next seed to drop is the Tree lupin seed, which is also copious in volume, and is edible so long as birds can choose when and how much. It will not be the major protein source but a significant source I think. Tagasaste

seed is next over January/February, along with Tree Medick. By then we have Goumi berries and Seabuckthorn berries. Comfrey all the way from October to May. Alfalfa from September to late May.

We're beginning to fill out the year's chicken food diet with high protein, low fibre food sources... really all that is needed now to have them laying very well is a larger source of live protein than we have just yet. I imagine it will take us another three years to have a deep enough compost layer on the ground for the chickens to be scratching for live protein all day. The key top that I think is to practice constant chop and drop, or producing ramial wood chip so we have carbon decomposing, feeding fungi and insects for the chickens to forage. Until then it is Soldier fly larvae in a greenhouse so we get them most of the winter. That will leave a patch in early Spring when it could be tricky because that is when the chickens like to lay best... I think I'll keep my Bloody Butcher Corn from the annual garden for now for that gap, until I learn what treasures this forest garden brings at that time of year as it gets older!

Our forest garden is 900sqm and we found that a total of 10 Brown leghorns was the maximum birds we could have on our soil, light and sandy and on a slope, before the birds would damage the ecology. We are now changing to Golden Campines in this chicken system, and those birds are smaller than Brown leghorns so the balance will change with numbers I'm sure.

Another thing we found having poultry in the forest garden (we have Chinese Weeder geese in there over the early Spring period to keep the grass down and provide us with an extra goose breeding area) was that they tend to hammer the comfrey too hard. So we established a separate comfrey pen, comfrey, alfalfa and chicory actually, so we could harvest these crops on a regular rotational basis following principles of management intensive grazing. This means we are able to know we are building soil as well as getting maximum sunlight harvesting and maximum production. When your birds eat the comfrey to the ground, or conversely, don't eat it enough and it goes to seed, you do not get maximum production or maximum carbon sequestration into building soil and simply feed them to the chickens and geese on a daily basis.

We have a good chicken house built with a wooden frame and light earth walls on the South and half way around the east and West, the rest of the walls are covered with chicken netting that keeps out birds and rats. The house has a skirt below the walls to keep rats from burrowing in as well.

We feed them in a Grandpa's Feeder to keep the birds off their food, and they usually have 10% free access to the forest garden. If we see there are stoats or ferrets around we might shut the door at night, and we have a stoat trap along the chicken house, which some years saves our birds!

The chicken house also has deep litter to absorb the manure they pass while in there. We put our corn husks in there each year along with many bags of deciduous tree leaves in the Autumn and they turn that into compost that we use mostly on the citrus trees in the forest garden each year.



Raising young in forest gardens makes strong healthy layers

# FEEDING CHICKENS IN A LARGER SCALE DESIGNED CHICKEN FORAGE Paddock

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This paddock could be any size at all, and it will be a great research project to see just what combination of trees and plants supports the greatest number of eggs with which chickens, in this situation.

From my current experience (and we do have one of these forage paddocks):

1. Do not underestimate the value of elderberries and mulberries.
2. Go to town with as many of the species in our chicken forage chart as you can, ensuring year round food dropping from the trees, and as much ramial on the ground as possible, or even better ramial wood chip to grow fungi and insects.
3. Use road-kill and possums etc. to grow as many maggots as possible
4. Install a solar light that shines all night with a hard white surface behind it to catch insects in a water trough below. The chickens will eat them in the morning, the ducks at night!



Chinese Weeder Geese



Cousins and baby chicken love



Brown Leghorn teenagers in the forest garden

# CHICKENS BEHIND COWS

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Obviously Joel Salatin has made this strategy world famous, and these systems are springing up everywhere, but I have never seen one designed to get off the industrial grain treadmill. My goal is to do that. I'm sure we can, it will take the time it takes to get a few trees dropping flowers, berries, seed and to milk the cow and send some milk the chicken's way perhaps.

Chickens behind cows is basically about maximising the return from having cows grazing using the management intensive grazing system where they are shifted every day or so. Usually this system means the cows are going on to longish grass, flowering diverse and full of life, and just about to go to seed, some seasons it will be seeding, and then not going back onto that grass again for at least 60-90 days. This allows a diverse range of grasses and plants to grow well, insect populations go through the roof, the cows grow fat and healthy and they leave a lot of trash to feed the microbes. They also leave their cow pats everywhere evenly spread over the entire area grazed which are immediately seen by myriad insects as the best place to lay their eggs. Three days after the cows have moved on this becomes a great set-up for chickens to enter the scene. Chickens scratch the cow pats and spread it around, eat the hatching bugs in it, scratch around in the grass especially where it is trampled down by the cows to protect the soil from erosion and drying out in the sun, and to feed the microbes. Under this mulch lies another myriad of insect life loved by chickens. In this 'management intensive' grazing regime chickens enjoy the diversity of plants and stages of growth, the insect life and the bugs in the cow pats. They don't need anything more than that to stay alive and healthy. They do need more than that if they are to lay a lot of eggs.

## **OUR TWO MAIN STRATEGIES ARE:**

1. Ensure we choose the chickens most suited to this type of management system. We'll discuss this more in Section 3.
2. Ensure we design into this system as many sources of high protein food in the form of pollen, flowers, berries, seeds and leaves as we can. Use the chart on page 38 to help with this.

We have tried running our chickens behind cows in the past and we have some issues that we need to front before beginning again.

1. You need a good chicken tractor that is:
  - a. Easy to shift all year round. Our chickens don't go into a barn in Winter.
  - b. Includes a water harvesting system from the roof.
  - c. Includes a solar light and system to trap and catch bugs for free protein and saves us feeding something at least short term.
  - d. Easy to use egg collection boxes.
  - e. Able to be shut up at night to keep out stoats and ferrets.
  - f. Includes a system for holding/managing food that keeps all other birds out of it! Wild ducks, geese, pheasants etc. all learn to use a Grandpa's Feeder.
2. There must be enough trees around that the chickens can really hide in the shade away from the hawks. There is no use setting chickens up in this system if the hawks can pick them off.
3. You need a large enough area for a chicken tractor system to work, well away from gardens and people's back yards or the chickens will go there instead. To avoid this requires space and daily shifting of their house so they don't get complacent about where home and food is. It possibly also requires sensitivity around how many chickens to how many cows as well as how many chickens per hectare. I don't know the answers to these questions, I just know that if your chickens are too close to people's gardens etc. it won't work! I'm going to find out though.



Note the Sicilian Buttercup comb, double and like a crown!

# Beginnings of a Perennial, Regenerative, Chicken Feed System.

## *In cold temperate climate, New Zealand*

PERENNIALS, LONG TERM SOLUTIONS, LOW ENERGY INPUTS												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Comfrey	●●	●●	●●	●●	●●					●●	●●	●●
Dock leaves	●●	●●	●●	●●	●●					●●	●●	●●
Chickweed	●●	●●	●●	●●	●●					●●	●●	●●
Alfalfa	●●	●●	●●	●●	●●	●●			●●	●●	●●	●●
Tagasaste greens	●●	●●	●●	●●	●●	●●	●●			●●	●●	●●
Sorrel	●●	●●	●●	●●	●●			●●	●●	●●	●●	●●
Chicory/endive				●●	●●	●●	●●	●●	●●	●●	●●	●●
Grass						●●	●●	●●	●●	●●	●●	●●
Clover	●●	●●	●●							●●	●●	●●
Tagasaste	■	■	■				▨	▨	▨			
Tree lupin					■	■						■
Siberian pea tree												■
Lespedeza bi colour			■	■	■							
Genista Yellow Imp			■	■	■							
Tree medick								▨	▨			
Grass seed	■	■										■
A. retinoides seed								▨	▨	▨	▨	▨
Pravissima								▨	▨	▨	▨	▨
Cultriformis								▨	▨	▨	▨	▨
Cardoon seed			■	■	■							
Mulberries				▩	▩	▩	▩	▩			▩	▩
Seabuckthorn				▩	▩	▩	▩	▩				
Choke berries	▩	▩	▩									
Hawthorne					▩	▩	▩	▩		▨	▨	
Goumi											▩	▩
Autumn olive			▩	▩	▩	▩		▨	▨			
Russian olive												▩
Elderberry	▩	▩	▩									
Oaks			▩	▩	▩						▨	▨
Karamu		▩	▩	▩	▩							
Forest garden insects				■	■	■				■	■	

Edible part greens	●●
Edible part flowers	▨
Edible part berries	▩
Edible part seeds	■
Edible pollen	▨

ANNUALS OR HIGH ENERGY INPUTS												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Sprouted, fermented or nixtamalised corn						■	■	■	■			
Soldier fly larvae	■	■	■	■						■	■	■
Milk	■	■	■	■	■	■	■	■	■	■	■	■
Whey	■	■	■	■	■	■	■	■	■	■	■	■
Curds						■	■	■	■			
Chicken minerals	■	■	■	■	■	■	■	■	■	■	■	■
Worms	■	■	■	■	■	■	■	■	■	■	■	■
Insects attracted to light	■	■	■	■	■	■	■	■	■	■	■	■
Raw meat scraps	■	■	■	■	■	■	■	■	■	■	■	■

- I can grow 100kgs of bloody butcher corn, or Kanga Ma, and possibly any flour type corn or maize, in 50sqm of biointensive garden that has highly mineralised soil and grows high brix corn. Eight hens (minimum number to maintain a breed for the long haul) and two roosters, also minimum number required, need 1kg of corn a day sprouted or nixtamalised. Grain doubles in weight when sprouted or nixtamalised so this is enough corn to last the chickens 200 days, so long as you have many other feed inputs you can stretch this out.
- From October to late March I will be raising replacements, and the rest for the freezer, they will eat the rest of the corn along with all of the above.
- If I was buying the grain it would cost approx \$2kg, including freight, max \$200 for the corn, \$200 for chicken minerals as well, total cost \$400. Value of eggs alone (say we average six eggs a day for nine months of the year totally possible) around \$800 at 50 cents an egg. We will also get to eat around 50 chickens (one a week) valued at around \$25 each (\$1250), and have ten breeding hens or roosters to sell at \$40 each, \$400. Inputs cost, a lot of skill and learning, investment in forest garden once, plus \$200-\$400 depending on what you are buying, outputs worth around \$2500.

# SPROUTING WHOLE GRAINS FOR POULTRY FOOD

In 2005 we received the following letter from a reader and I used it for many years until I decided to try to go grain free, and also until I tried the fermentation system. I really noticed that the smell in the chook house totally changed when we went from organic pellets to organic sprouted grains; far sweeter and more pleasant a smell!

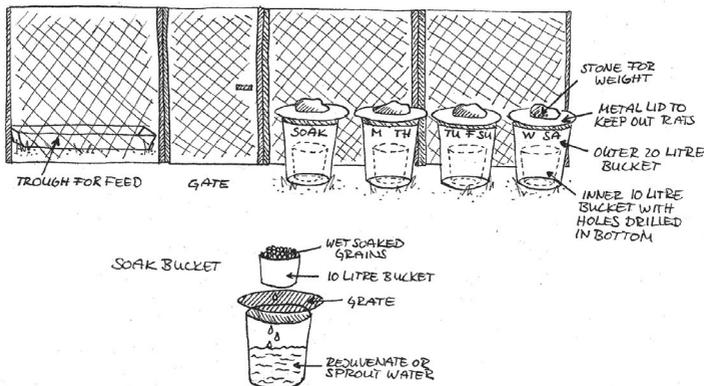
JUST ONE WORD OF WARNING THOUGH! The only whole grains you can do this with are those certified organic. All others are irradiated or treated in some way so that they do not sprout when soaked, they rot!

*Hello at Heritage Poultry!*

*Thought I'd share with you how I sprout my whole grains. I am a small scale egg producer for Common Sense Organics in Lower Hutt. I have a flock of about 40 hens, mostly White Leghorns.*

*I too, use only whole grains as feed. I gave up commercial feeds about 6 years ago. Whole grains which are sprouted are at least 6 times more nutritious than dry whole grains. Here is how I do it. (I use mostly wheat but some barley and corn when available)*

*Below you see how my soak bucket and sprouting buckets are set up. Now I will show you how to soak and sprout the grains using these buckets. Let us say that it is Monday morning.*



Sprouting Whole Grains For Poultry Food

## *Sprouting Whole Grains For Poultry Food*

*Drain the grains which soaked in the soak bucket overnight on Sunday night and most of Sunday. Use the grate which is an old refrigerator shelf. Pull out the dripping wet grains and place the grate over the bucket, then the bucket of wet grains over the grate.*

*Remove the 10 litre inner bucket from the 20 litre outer bucket marked 'M TH'. The grains in this bucket have been sprouting since Thursday. Feed these out.*

*Now go back to the bucket in step 1 which you drained over the soak bucket. It should be dry enough now to place into the 'M TH' bucket where it will sprout until Thursday. Be sure to keep metal lids and a weight on top to keep the rats out of all buckets.*

*Now refill with dry grains the bucket you fed out in step 2. Place this bucket into the soak bucket. Soak water should be reused about three times. This allows it to slightly ferment and produce a product called rejuvelac. (Never use soak water from legumes as it is toxic.) After about three uses, pour the slightly viscous soak water into your water trough. My troughs are all wall paper troughs purchased from the Sally Army for a dollar! I tie them to the fence.*

*On Tuesday the process is the same but you are feeding out from the bucket marked 'TU F SU' and so you go through the buckets until you come back to the 'M TH' bucket again and repeat the cycle.*

*It's taken me long time and a lot of experimenting with this system. At first I Used 7 buckets but I found the rains over sprouted and not as palatable especially in Summer and they were also difficult to extract from the bucket. I use a lot of other supplements, they are: yoghurt, kefir, fruit and veg scraps, worms, slaters, curds, fresh and dried comfrey, stinging nettle, crushed shells.*

*Pam Adam*

The sprouted grains is a lovely system, and will be the system some people choose, I swapped to fermented grains because it was easier and supposedly makes the nourishment in the grain even more available to the chickens.

The Fermented Grains system is far simpler, but gets too smelly for some people, depending on how long you ferment the grain.

Basically you put your whole grain into a bucket and cover with water. Make sure all grain is covered all the time or the grain goes rotten and smells. Best to leave for three days in the Summer but it doesn't matter how long you leave it. It always remains edible and nutritious for the chickens. I used to do enough in one bucket for a week, and when I started feeding that bucket, some each day, I began the next bucket. In winter it takes longer to feel as though it is well fermented. The fermentation is an anaerobic ferment that means the grain contains more nutrition and goes further than it does before being fermented.



Beautiful Sicilian Buttercup pullet

## SECTION 3 – GETTING THE BEST GENETICS FOR YOU

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### THE IDEAL BIRD

So we can maybe begin to see what our chicken food system might look like, the way we are going to feed our chickens and provide them with the things they need to be healthy happy and producing eggs... what now do our ideal birds look like?

I think it's easier to imagine what kind of birds we need if we think of the environment we can provide for them first, or at least decide if we want ducks or chickens based on the environment we can provide.

Is it going to be an urban garden situation where they are shut in and being fed daily and needing to be really good diggers and turners over of ramial wood chip? Or will they be in a forest garden situation where they need to be excellent foragers, especially for insects, or will they be behind cows? Or will they be in a far larger grassy site with large forage trees around, short grass and a stream or river, is the soil steep dry and bony?

Maybe you have a swampy grassy area that is being grazed by other animals that just looks like duck pasture...

If you look at our chicken and duck info chart on page 50 you can see where in the world each chicken breed originated and what kind of conditions they might do best in. Do they enjoy cold winters, or hot Summers, or wet pasture, or being fed milk, or heavy soil or a forest situation, or are they good at keeping out of the way of hawks, etc.? What qualities do your birds need?

It's not as simple as I thought to answer the question posed above, "What does my ideal bird look like?" I've been asking myself that question for a long time.

At this point I would say on our family house site, my top priorities are:

1. To have to take care of and maintain for the long haul, as few breeds as possible (chickens or ducks) to supply our eggs... approx. three dozen per week. It is a serious job and I don't have a situation or time for more than I need.

2. Finding a breed that lays well with the least amount of the kinds of food that I can easily provide, i.e. it is able to convert this food to eggs very efficiently.
3. To find a breed that doesn't go clucky more than once early in the season, (usually breeds that go clucky lay far less eggs and they take a lot more energy to either stop from going clucky or to look after and protect chickens hatching randomly).
4. A bird that matures early and always begins laying in the Autumn in its first year so we always have eggs through the winter without the need for another breed.
5. To have a bird that is a very strong forager.
6. That goes into the moult late and has a short moult period.
7. Is friendly and easy to live around and manage and safe with young children.
8. Easy to manage, do not require high fences etc.
9. Is intelligent around hawks.
10. Is super healthy with a strong immune system.
11. Has enough meat on its body that it can be an acceptable table bird.
12. Able to turn over and make compost with leaves in scratch yard.

## **OUR STORY AROUND CHOOSING BREEDS**

We began with Cayuga ducks. Easy to fence (initially our top priority) and we had loads of appropriate pasture, wetlands and paddocks containing lots of duck food (slugs, snails, bugs, grass and water) when we lived in Kaiwaka. They are great mothers, good eating birds as well, and also beautiful natured birds. Our children grew up on super nutritious Cayuga duck eggs. At some point our boys wanted to breed chickens so we added them... loads of learning for children in keeping animals. They learn lots about warm fuzzy ducklings and chickens, and life and death.

We chose Brown Leghorns as our chicken egg producers and have been maintaining a Brown Leghorn breeding flock that originally came from Ken Vincent over 35 years ago now. We choose them because, apart from White

leghorns which we didn't want, they were amongst the very top egg producers out of all the heritage chicken breeds.

White chickens are easier for hawks to pick off than other colours and we had bad hawk issues in Kaiwaka. We were able to get them from Ken Vincent who we had chosen as being the very best chicken breeder around in NZ at that time for us, because he was breeding for actual egg production, as well as being free range and getting whole grain soaked in milk, as well as being bred stringently to the NZ Poultry Standards, and because in his experience they were great foragers.

After all this time of selecting Brown Leghorns for those that do best in our conditions, which has meant no industrial grain and very little grain at all other than grass seed, and a little Kaanga Ma, ours are doing better than they ever have. This year they all moulted very fast (none actually lost their feathers all at once and had bare patches) and were only off the lay for around 10 weeks (3 year old birds). I put that down to the 'chicken mince' they get, minced old billy goats! They are all larger birds now than they were when we started, possibly also down to the high protein diet!

I've always been very happy with them as egg layers, friendly companions, compost makers and foragers and they don't go clucky. I was happy with that and originally we also chose to keep another breed that does always go clucky, the stunning Golden Wyandotte's.

Our home forest garden where we keep our chickens is 900sqm, and I have found that having more than around 10 chickens (minimum numbers 8-10 hens and 2 roosters per breed) degrades the environment, scratching etc. so we went down to the egg layers only to save their environment, the Brown Leghorns.

When our boys were still living at home, Rana had a large incubator and hatched eggs and sold day old chickens and we got our replacements from there. These days I don't want to use an incubator, I want my chickens being hatched under birds at least, so that has been another whole journey.

First we decided to use muscovies, because they are such good mothers and go clucky often, usually three times a season. That is the positive, the difficult thing about muscovies is that they are pretty much impossible to manage, they climb fences and fly wherever they like. Once I realised that didn't matter, and they would always come back to a handful of feed we came to a

good understanding and we still use them successfully to hatch our chickens, and we also have a few bantams that work well too. Overall I think I prefer muscovies because they are grass eaters and I don't need to feed them, apart from a little to be able to manage them.

Right now I'm at that point where I can see my Brown Leghorns are looking amazing, they lay well, and as I write this it is Christmas Eve and they are laying every day and have been so since July, and they are three years old! I love them.

I also have a feeling that just in the same way that large cattle require more feed to maintain their size before they put on weight, and same with sheep, that it is the same with chickens. The smaller the chicken, the more efficient they should be able to convert food to eggs, or meat for that matter. That is the way it is with our Dexter cows. So each cow or bird produces less than a bigger cow or bird, but they produce more per hectare in the case of cows and more profit in terms of the eggs because they require less feed than the others laying larger eggs, i.e., we get more profit per hectare, or per ton of chicken feed, because they are more efficient converters of the feed.

We are not used to eating smaller eggs, or even white eggs anymore, but my feeling is that if we want efficiency in conversion of food to eggs or meat, the smaller the chicken the more efficient the production will be.

So I began asking around. I asked on social media, and most people couldn't get what I was asking, "which chickens do you think are the most efficient converters of feed to eggs and meat?" When we feed them layer pellets from the shop we don't even think about such things. I do because that grain production is killing the earth and making species extinct. I want out of that. I want to feed my chickens myself. I've been doing that now for a few years and I can see just how much they eat and how much work that is and it is becoming more and more important to me that I face the issue and figure what my best birds will be looking like... which birds produce the most for the least work?

In the end the only people who could answer my question were people who were already feeding chickens themselves without industrial grain, and I got one very loud and clear response. Her answer was in her experience, and she had a lot of breeds and no industrial food, Araucana chickens. She said they laid very well, most of the year, only went clucky once at most, were

incredible scratchers and finders of food, and converters of food into eggs, and makers of compost, very quiet and laid colourful eggs.

So we bought some colourful Araucana birds for our ReGeneration Productions Urban Garden, to give them a trial. We'd never entertained the idea of keeping Araucana chickens before and we were all sceptical, about most of the claims above.

We also talked to Ken Vincent who still has his favourite chicken breeds after a whole life of breeding and raising chickens for sale. I went up to visit him to ask him "Which breeds do you think produce the most for the least food and effort?" and his answer was, "Go and look and see which breeds I still have left after all these years of whittling the breeds down to a number more manageable at my age! I kept the best!"

The two stand-out breeds in his opinion for efficiency of conversion of feed to eggs are Golden Campines and Sicilian Buttercups. Both breeds are smaller than Brown Leghorns or most other heritage breeds although there are other smaller birds. They lay white eggs which are out of fashion, and the eggs are a bit smaller than Brown Leghorn eggs are too. It seems we are addicted to not only brown eggs but also large eggs.

So it seems as though, just as our Dexter cattle only eat half as much and weigh half as much as Friesian cows, they produce more milk per hectare, or from a certain amount of grass, so the smaller chickens possibly have the potential to also be more efficient converters of chicken feed to eggs.

Ken had certainly noticed that in his experience. Taiamai and I were pretty surprised about his response because we had had Golden Campines years ago and had in fact been part of saving them in New Zealand 20 years ago or more. We had them in those days because we liked the look of them and because they had been bred in Belgium to lay eggs and grow meat on milk and pasture. We had sold them a long time ago however because we had not been able to do a good job of keeping so many breeds alive and I had chosen Brown Leghorns, and Taiamai Golden Legbars. So here we are now going full circle, back to breeding Golden Campines with the idea of running them behind our Dexter herd, once we get enough trees around to keep them out of hawk site and action. They can then go back to their origins and live off diverse high quality cow pasture, which includes flowering plants, lots of insects, the grubs in the cow pats and milk!

I had never heard of Sicilian Buttercups but once again Taiamai had had some experience with them and loved them. They will be his breed, the Golden Campines mine. The Araucana will be in the ReGen productions Urban garden, and if and when we can get a good start with Old English game we will find a way to keep them as well. On top of that we have Black Indian Runner ducks who will also end up down on the River block on pasture, probably with pigs, as well as Muscovies we keep for our incubators in the meantime, and on top of that our very precious and beautiful Chinese Weeder geese.

Chinese Weeder geese have been in trouble in NZ for years now. Not enough genetic diversity in the birds around, breeding issues, and so no more young birds.

This past season Taiamai put a huge effort into collecting Chinese Weeder geese from all around NZ, mainly North Island but also South Island, and taking very good care of them, and trying to raise some young. We succeeded in raising enough young birds to make a great start next year with serious Chinese Weeder geese breeding. We have four distinct families from various places, some of which came from Koanga many years ago so are still related. We believe there is so much value in Chinese Weeder geese that keeping them strong in NZ is super important. The best thing this year has been raising them ourselves rather than leaving them with mothers. It has been a wonderful experience, especially for the one year old! They are all so very tame, and they are such gentle, non-aggressive birds. All the kids just loved them, and cuddled them and carried them around. They will always be very tame birds and easy to manage.

Taiamai and I are still keen to breed a line of chickens of our own one day, first we'll do a good job of the Golden Campine and Sicilian Buttercups and black Indian Runners and Chinese Weeder geese.

So choosing the best breeds is one thing... keeping these breeds alive and tracking well into the future is another thing entirely... and doing a good job.

It is a bit overwhelming looking at all the possible strategies in the Poultry Breeds Chart overleaf. All good information but where does one start?



Golden Campine and Sicilian  
Buttercup roosters



Young Brown Leghorn pullet and rooster



Geese and ducks breed better and remain healthier if they can get into water

## POULTRY BREEDS AND THEIR CHARACTERISTICS

CHICKENS	Size	Utility	Egg production	Egg size	Egg colour	Months to lay	Foraging ability	Broodiness	Temp.
Araucana	Light	yes	4	med	blue	6	4	3	
Ancona	Light	no	4	large	white	6	4	1	3
Andalusian	Light	no	4	large	white	6	4	1	1
Campine	Light	yes	5	med	white	6	5	1	3
Minorcas	Light	no	4	large	white	6	4	1	1
Leghorns	Light	no	5	med	white	6	4	1	3
Legbar	Light	yes	5	large	white	6	4	2	4
New Hampshire	Heavy	yes	4	large	brown	8	4	2	5
Australorps	Heavy	yes	4	large	brown	6	3	4	4
Barred Rock	Heavy	yes	4	large	brown	8	3	3	3
Wyndotte	Heavy	yes	4	med	brown	8	3	4	5
Light Sussex	Heavy	yes	3	med	cream	8	3	4	4
Barnevelder	Heavy	yes	3	med	brown	8	3		4-5
Dorking	Heavy	meat	2		cream	8	3		
Sicilian Buttercup	Light	yes	5	large	white	6	5	3	3

## From Over 60 years experience in NZ with Ken Vincent

Cold tolerant	Soils tolerance	Live weight lb	Meat producers	Weeks to kill	Origin	Comments
		6 – 7	3		Chile	Average foragers and producers.
3		5 – 6	1	N/A	Italy	Practical, lay well, good foragers, hardy, pretty.
3		7 – 8	1		Spain	Lay long time, both many years and within the season.
4		6	3		Belgium	Top as far as hardy and egg production, efficient eaters and good at avoiding predators.
		6 – 8	1		Spain	Pretty, very large eggs, hardy, eat more than others.
5	Heavy	6	1	N/A	Spain	Lots of feed to get eggs, not as good foragers as Campines.
4		6 – 6.5	3		UK	Good backyard bird. Lay many years, needed lots of food.
5			4		USA	Good as you get for a brown egg layer, best for brown eggs, don't go broody, best of heavy breeds.
		8 – 9	4		Australia	Better than Orpingtons, improved strain, like New Hampshire.
4		8 – 9	4		USA	Pretty few eggs, aggressive.
4		8	4		USA	Not good layers, great mothers, hardy, roam but few eggs.
4		9	4		UK	Nicest natured chook around, like their food, big eggs.
					Holland	Lovely bird, good natured, heavy breed, lay as good as others.
					UK	Basically a meat bird, big eaters.
						Ken's favourite, best producer, most efficient converter.

Silkie	Light	no	1	small	cream	6	3	5	5
Pekin	B	no	2	small	white	6	1	5	5
Indian Game	Light	no	2	med	cream	8	5	3	2
Japanese Bantam	B	no	1	small	white	6	2	4	4
Cochin	Heavy	yes	4		brown	8		5	
<b>DUCKS</b>	Size	Utility	Egg production	Egg size	Egg colour	Months to lay	Foraging ability	Broodiness	Temp.
Khaki Campbell		yes	5	large	white		5	4	
Cayuga		yes	4	large	white		5	4	
Indian Runners		no	5	large	white		5..	2	
Muscovy		no	1	large			5	5	5
Pekin		no	2	large	white				
Orpington		yes	4	large					
<b>GEESE</b>	Size	Utility	Egg production	Egg size	Egg colour	Months to lay	Foraging ability	Broodiness	Temp.
Chinese			1	large	white				

		3	1		China	Few eggs, good mothers, hardy, average foragers.
		1.5 – 2	1		China	Gorgeous natured, small eggs, cute.
		8			UK	Good eating, not an egg bird.
		1.5			Japan	Not egg producers.
					NZ	
Cold tolerant	Soils tolerance	Live weight lb	Meat producers	Weeks to kill	Origin	Comments
		5 – 5.2			UK	Pull in the wild ducks, mate with mallards, good layers.
		8	3		USA	Beautiful nature, harder to breed, average layers.
		3 – 4	1		Asia	Nothing touches runners, best for egg production, hawks, foragers.
5		10 – 14	4		South America	Meat producers wonderful.
		9	5		Asia	Big and clumsy.
		5 – 7.5			UK	Lovely nature. Not as good as Indian Runners. Hard to breed and keep.
Cold tolerant	Soils tolerance	Live weight lb	Meat producers	Weeks to kill	Origin	Comments
		15 – 22			China	Cannot fly, grazers, quiet and very useful in the forest garden, high quality meat for no cost!



Chinese Weeder geese

## DUCKS AS EGG LAYERS

We had ducks as part of our family way before we had chickens because ducks are far easier to manage than chickens, if you have an appropriate space. They need flattish, wettish low land areas, with short grass, lots of it. They only need very low fences 30-50cm depending on duck (I'm not talking muscovies here and they are not true ducks either).

We had our beautiful black cayugas because they were dual purpose and we had them from Ken Vincent who had done an incredible job of breeding them through the years.

When we left Kaiwaka we lost our ducks of 20 years to a neighbour's dog and were very sad about it for a long time. Since then we lived in places that were better suited to chickens, being drier, with sandy lighter soils.

Our place now, Kotare Village, Wairoa has ideal environments for both chickens and ducks, and we always loved ducks so were keen to get more.

We chose to begin again with Indian Runner ducks. Indian Runners because they are the best layers of all the ducks, and before the days of industrial chicken egg production were the birds that laid our shop eggs!

They are super active foragers and are capable of collecting a lot of their own food, as chickens are too but only in an ideal situation (a well developed Forest Garden) and they take years to develop. If you have a wetland you have a great place for ducks to forage and good quality pasture as well.

Their eggs are way more nutritious than chicken eggs and also far larger, so you get a better deal if nutrition is important... and now that we are seriously trying to learn to grow eggs without industrial grains ducks look like an easier option for some.

Like chickens, ducks can easily be trained to eat comfrey and to eat curds, soldier fly larvae etc., but if you have to feed them most of their food, they are harder to keep well nourished and laying than chickens are. Ducks are the 'go' if you have flattish wetlands and paddocks grazed by cows.

Ken Vincent says that Indian Runners are also the best at avoiding being taken by hawks. Indian Runner ducks need a lot of foraging room, if you want them to pay well, they hate being enclosed.

## DUCK EGGS VS CHICKEN EGGS

Farm Fresh eggs with a rich smooth orange yolk whether chicken eggs or duck eggs will surprise you if you have only experienced the colourless and flavourless supermarket versions. What most people do not know is that duck eggs are far superior to chicken eggs with the same taste and richer smoother consistency yet better than a chicken egg in many ways:

1. Duck eggs have around twice the nutritional value of a chicken egg and stay fresher longer due to their thicker shell.
2. Duck eggs are richer with more Albumen making cakes and pastries fluffier and richer.
3. Duck Eggs have more Omega 3 fatty acids, something you can actually see in the salted pickled eggs the Chinese love to eat. Omega 3 is thought to improve everything from brain health to healthy skin.
4. Egg allergy substitutes. One health benefit with duck eggs is that most people who are allergic to chicken eggs are able to eat duck eggs without allergic reactions.

*Duck Eggs vs Chicken Eggs: easily distinguishable, a considerably longer shelf life*

Duck eggs are quite large compared to chicken eggs, which makes them easily distinguishable. Another distinct difference is that the duck egg's shell is a lot tougher than a normal chicken egg's shell. Though that makes them a lot more difficult to crack, it is also supposed to provide them with a considerably longer shelf life. By long, I mean six weeks at maximum, if you keep them refrigerated.

The large size of the duck egg gives it a larger yoke to white ratio than a chicken egg. So if you want more yoke, duck eggs are what you should go for. With the larger size you definitely get more for your money, compared to a chicken egg!

*Duck Eggs vs Chicken Eggs: Nutrition*

6x the Vitamin D, 2x the Vitamin A, and 2x the cholesterol in duck eggs vs chicken eggs. Duck contains about 75% of the Vitamin E in chicken eggs. Duck eggs reportedly also have more Vitamin K2. Duck eggs also are higher in calories for the same weight quantity, probably due to its slightly higher

fat concentration. Also, keep in mind that the eggs of free-range, pastured animals generally have higher levels of vitamins and higher levels of omega-3 fatty acids. The yolks are darker, yellower, indicating a higher nutrient density.

A 100gm of duck egg will provide about 185 KCal of energy, compared to 149 KCal of energy provided by a chicken egg. Both types of eggs, match each other in terms of carbohydrate content, while the protein content is slightly higher in the duck eggs compared to chicken eggs. The mineral content of duck eggs is very similar. Both contain selenium, manganese, zinc, copper, potassium, sodium, phosphorus, calcium and iron. The duck eggs contain slightly higher amounts of all these minerals.

Same is the case with vitamin content in both of them. The vitamin content too is similar, but duck eggs have a higher amount of each one of them, which includes thiamin, niacin, riboflavin, pantothenic acid, folate, vitamin B6, vitamin D, vitamin E, vitamin A, vitamin B12 and retinol.

100gm of duck eggs will have about 3.68gm of saturated fat, compared to 3.1gm in chicken eggs. The mono unsaturated fat content is about 50% more in duck eggs as against chicken eggs. The amino acid content profile is also similar for both eggs, but again duck eggs contain more of them. The amino acids included are threonine, isoleucine, tryptophan, leucine, methionine, lysine, cystine, tyrosine, phenylalanine, valine, serine, glycine, proline, aspartic acid, histidine, alanine, and arginine.



Freida and Robby with Golden Campines



Elanor, Robby and Freida with Golden Campine chickens

## KEEPING A HERITAGE BREED ALIVE

When my children were young two of them were totally mad about poultry. Arana and Taiamai. They home schooled so there was lots of time to follow their interests up, and we had flash chicken houses and incubators etc... and I loved learning with them. By the time he was 13, Rana had his own business selling day old chickens from a large incubator in his bedroom, and Taiamai went on to be a key part of saving two breeds of chickens in NZ, the Golden Legbars, and the Golden Campines.

We had the privilege to get to know two key men in Northland who had been poultry judges and breeders most of their lives (Ken Vincent and Viv Purdon), and they taught us a lot. They also sold us breeding hens of some of their breeds.

Ken Vincent is one of those men, he still owns and operates Swan Lake Poultry with his wife Ruth, out of Kaitaia, and he is an amazing person if you want to know anything about poultry.

He has kept every breed over the years and for all of that time he kept them free range and he milks cows to give them milk and whole grains. He bred them for egg production as well as meeting the poultry standards which is unusual (rare) today.

We learned that most breeders are not breeding for egg production, so even if you get a heritage breed that says they are good egg layers in all the books, check out if they are still being bred for egg production... It is rare these days to find a poultry breeder who selects and or breeds for egg production, or even a breeder who uses the NZ Poultry standards. Do not be fooled into thinking that just because the breed you like is reputed to lay a lot of eggs that they will. It all depends on what your breeder has been breeding or selecting for. Selecting for egg production has, since industrial chickens and egg production systems became the norm, become a thing of the past. Most heritage poultry breeders these days just do not have minimum numbers of young birds from a minimum number of hens, to select from, do not do the hard yards to record egg production, a super time consuming job, or a very careful job of selecting to the standards, or even really understanding what all the many things we could be selecting for are, and in fact need to select for and so by default the birds we love slowly decline. This is the state of things all around the world since industrial eggs hit the scene. It is our job to turn that around, it is called food security, or bioregional food resilience!

We learned from the Chicken Design Notes in Chapter 1 that to be successful in any breeding program we must be first of all Conservation Breeders, then we must be Productivity breeders.

Lets start with conservation, without the genetic diversity forget the rest!

## **CONSERVATION BREEDING**

Or maintenance of genetic diversity... the very same thing we do with our heritage seed lines! There are two main ways to do this that are suitable for serious home scale breeders, Line Breeding and Spiral Breeding.

### *Line Breeding*

My Brown Leghorns came from Ken Vincent in the late 80s, and we have kept them going ever since. We used the method that both Ken and Viv Purdon taught us, which is I think perhaps the simplest for most home gardeners or those of us seriously trying to live off the land, careful line breeding with minimum numbers for genetic diversity.

We learned that in order to keep a breed strong one must have a minimum of two roosters and 8-10 hens. Around 60 young birds must be hatched each season, including chickens from all 8-10 of the hens. The best two roosters chosen from the half that are young roosters and the best 3-5 young pullets chosen from the half that will be hens, to bring into the flock as replacements each year. It is best to replace 1/3 of your layers with pullets each year. 1/3 is a good figure because it leaves the best three-year-old hens to lay and produce large eggs for hatching each year. The older a hen gets the larger the eggs get. The larger the eggs the larger and stronger the chicken. In order to maintain genetic diversity in the flock it is critical that your replacement birds are the best from all the different hens, not all from the same hen, which would keep narrowing the genetics.

So each Spring, you put your chosen two young cockerels with your breeding hens (mother/son breeding) from last year, but not with the young pullets from last year because they are brothers and sisters. You then put your pullets with the two old roosters who were with the breeding flock of hens last year. They aren't really old, just a year older, but the key thing is that they aren't the brothers of the pullets, they are the fathers.

In order to do this you will need more than one secure place to keep your chickens. You will need a place for your main breeding/laying flock, a place for all the young ones. Once you choose your replacement roosters and pullets and either put the rest in the freezer or sell or give away preferably by April, you can swap roosters, so the young roosters go in with the main breeding hen flock, and the older roosters are in with the young pullets. This way you will have mothers and sons and fathers and daughters but not brothers and sisters breeding.

According to Harvey Ussery this used to be called the 'old farmers' breeding method, but I think that it is 'line breeding' at its best.

Once your chickens are hatched and left their mothers each Spring, they need to be kept separate to the laying hens for various reasons. I found the layers don't like them around and they don't lay as well, and the young ones can't compete with the older birds for feed so don't do as well.

You need to keep all of these replacements until they are old enough for you to be able to look at them and decide which your best two young roosters are, and which your best hens are, usually March/April at the latest.

Checking out the NZ Poultry Standards could help, but I will show you this process in the next section, page 62.

I have always been quite happy raising that many young birds because it really works out perfectly for us. If we keep one breed alive per family we end up with enough roosters to go into the freezer each May to give us one bird a week throughout the year, and then we sell all the excess good pullets and roosters as breeding stock.

This is called line breeding and was the way most old time poultry breeders operated, in fact all farm animals were bred like this. It only works if you keep minimum numbers as above, or more, and you get good at your observation skills so you can do a good job of the next part of the breeding, Productivity Breeding.

We have had years when we did not have the facilities to keep the young pullets out of the laying/breeding area with the laying hens, and young cockerels who would be the pullets brothers. In this case I just make sure I never use the smaller pullets eggs to hatch. That has been a very effective way to ensure we are not breeding brother sister, which would more than likely cause our flock to decline.

So I guess in the very simplest form of line breeding one can get away with having all the laying flock in together, just be sure not to hatch eggs from the pullets which are usually easy to pick.

Ideally we would keep our pullets with the older roosters in another breeding pen and collect their eggs too to maintain widest possible genetic diversity in the breeding flock.

### *Spiral Breeding*

Spiral breeding is another conservation breeding system, however it requires more facilities, time and space and an ability to be able to maintain more birds. If you did a good job of it you would have eggs to sell with more layers and you would end up with more quality breeding stock to sell as well. It could be a small business for you, selling eggs, fertile eggs and breeding stock. The economics of course will depend upon setting up great feeding systems that do not cost the earth and nourish the chickens well. As we covered in 'Designing eggs without industrial grains'.

In spiral breeding we need to maintain a minimum of three breeding flocks or families of chickens. Each of these families will have minimum numbers as in line breeding above, and each year you will choose the best pullets as replacements for 1/3 of your layers and each year you will select your two best young cockerels. The difference is that these cockerels will not go over the laying hens in this family but over the laying hens in the next family. So if you give your families colour coding bands, then one family could have red bands, one green and one blue. So if your red roosters go over the yellow hens then the yellow cockerels go over the green hens and the green cockerels go over the red hens. With this system you don't need to keep the young pullets away from the laying hens, because the rooster is unrelated.

This system would mean you will have a minimum of approximately 24-30 laying hens and pullets in three separate families and spaces, and around 180 young birds coming on which will need careful banding or toe punching to easily be able to keep records and identify them as members of three different families, for recording information and later selection processes.

Ok so we now have our two main Conservation Breeding strategies, it's up to us to choose the one that suits us.

It is now time to begin working on a process for Production Breeding.

Our birds are hatched in Spring in time to begin laying before Winter usually beginning in May, and then lay for a year or 11 months before having a three month moulting break. All older birds begin laying in July/August ready to go until the following March/April if fed well. To have eggs year round it is critical to have young birds hatched each Spring as early as possible.

My number one tip to breed large, healthy birds, able to forage strongly for their food, is to let them forage hard when very young and raise them on fresh air, free range, healthy soil, plus curds and alfalfa with poultry minerals in it.



Araucana chicks



Young Sicilian Buttercups

# PRODUCTION BREEDING

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I wish I had the ability to see the things in the animals that Taiamai can 'see'. I don't know if he is so good at 'seeing', or observing animals because he has lived with them and grown up with them all his life, or if he is just good at it. I'm always conscious that he sees things well before I do. Good observation skills are critical in this 'selection' stage of breeding. I find it a good idea to give my chickens coloured leg bands so I can watch them and see who is doing what and who is the best forager etc. and learn which colour that chicken is so I can record info.

1. Our first job here is to get very very very clear what the characteristics of our ideal birds will be... I keep revising my list. Check it out on page 50.
2. Be aware always that what we are looking for is a balance of all of our desired traits. It is likely we will make more progress towards our ideal by maintaining balance because many traits are genetically interrelated.
3. Our next job here is to cull any chickens that have obvious health issues/ poor immune systems, are aggressive, and birth defects such as crooked keel, crossed beaks, and malformed feet. The last three items here are usually the result of humidity being wrong in the incubator during incubation.
4. Our next job is selection of breeders based on the production qualities of your ideal birds, possibly including:
  - a. Foraging ability, the first out in the morning and last in at night are usually the best.
  - b. How many eggs a chicken lays, determined by either trap nesting, observation and recording or a manual examination.
  - c. The rate of growth. Determined by weighing all birds at 8 and 16 weeks.
  - d. The mature weight at 16 weeks.
  - e. Weeks to maturity, the earlier they begin laying the less cost to produce.
  - f. Width of skull, a reflection of the overall health and strength and productivity of the bird.

- g. Width of feathers, the wider the feathers the less energy is taken up keeping warm, so more energy available for other things.
  - h. Do the birds go clucky, when, how many times?
5. Once you have your production traits making good progress then it is time to focus more on secondary traits, such as desired feathering, and colouring.
  6. So we're using the above process to select our replacement breeding birds each year, now it is time to do some careful egg selection. Egg characteristics are highly heritable. We want the large (the larger the egg the larger and stronger the chicken), smooth shelled, hard shelled, eggs with no wrinkles in the shell, no chalkiness, no calcium spots, nothing irregular. We may also be selecting for colour so this is an opportunity to do that here too.
  7. In a good breeding program we will get our standards a little higher each year, over years we will change our birds significantly from those they came from, and we will have something far better suited to us and our conditions, back to the beginning again, selection of your breeding birds, and then eggs each year.

## **IDENTIFICATION OF BIRDS**

Identification of birds in a breeding flock is a big issue here when we are trying to be recording information about individual birds on a regular basis. If you are line breeding with all of your birds in one flock then I try to have coloured bands on their legs with each bird a different colour or combination of colours as well as another band showing year of birth colour.

That way I can identify each bird easily by sight without needing to pick them up. When they are young and identification is critical there are other kinds of bands you can get that work well. The other option, which is possibly the best, certainly records far better info about how each chicken is, is toe punching. Like piercing one's ear. If you are practicing spiral breeding then each family will need all the same colour on their bands and other information will probably need to be recorded by toe punching.

## WONDERING ABOUT POULTRY FOR MEAT PRODUCTION?

So we're on a journey towards finding out what our ideal egg producers are... but I can't finish without adding something about meat producers.

After over 30 odd years of breeding chickens ducks and geese my feeling is that raising the huge breasted birds people are used to eating, in a regenerative way, is totally unsustainable, each bird would cost hundreds of dollars.

I don't think that choosing or breeding birds that are only good for meat production will ever do it, in any regenerative system. They simply require too much energy to produce and in a regenerative system it comes from that system not from the earth or our grandchildren as it does in the current system.

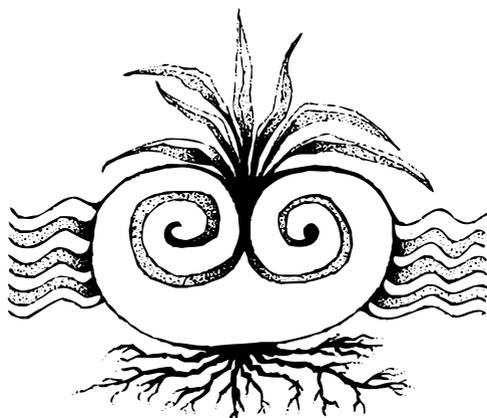
The way I see it we eat the males not required for breeding, from the breeds we choose for eggs as our ancestors always did, choose your breed carefully with that in mind. The other options are to eat the birds that are grazers. Muscovies and Geese are both beautiful meat birds and require no grains at all. They both love comfrey and anything else that falls in a forest garden, but newly growing short grass is their protein! I think they do well behind cows. In the past, most dairy farmers kept geese because they were known to keep liver fluke numbers down in the wetlands, and so most dairy farmers ate goose. They are regarded as pets these days, but it is easy to see the ecological niche they prefer by simply looking around. Chinese Weeder Geese are far easier to manage.

If you are interested in breeding stock check out our Thorny Croft Facebook page and website:

<https://www.facebook.com/Thorny-Croft-1434692703252324/>

<https://www.koanga.org.nz/knowledgebase/thorny-croft-animals-knowledge/>





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