LAYER MANAGEMENT GUIDE

Bond White Layer

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BOND ENTERPRISES

Contents

Introduction

The performance of Bond layers has been continuously improved over many generations by genetic selection. Testing and selection has been done in Australia in conventional open sided sheds which means these layers are specifically adapted to barn and free range farming systems while still performing well in controlled environments.

As with any livestock, performance expectations (capabilities) will be influenced by management, nutrition and disease which are all under your control. The purpose of this guide is to provide detailed advice, obtained from our testing and experience, to assist you in obtaining the expected performance from your chosen Bond layer.

Environment, particularly temperature, will also influence the performance of any layer. Adaptation to high temperatures is highly genetic and the Bond layers, being selected in the environment in which they are expected to perform, are highly adapted to the high (and low) temperatures of the Australian environment.

Advice to assist with maintaining good performance in temperature extremes is also provided in this management guide.

This management guide provides generalised information for all our layers. Where information is required about a specific layer you may also need to consult the respective Performance Guide.

Quarantine and General Hygiene

Quarantine and general hygiene are the cornerstones of good farm biosecurity and ultimately assist in attaining the full performance potential of your livestock.

You should treat your property as a quarantine area by providing signage to that effect and advising visitors against entry without prior authorisation.

When visitors and vehicles are allowed entry, restrict their movement as much as possible. It is advisable to keep a record of persons/vehicles entering your property.

Farm hygiene should be a top priority. All sheds should be vermin and wild bird proof and good rodent control should be practised.

Single aged flocks should be aimed for so that sheds become all in all out, allowing a good clean out between batches. Single aged rearing sheds allow an effective immunological status to be developed while the pullets are being vaccinated during rearing.

Traffic between sheds, particularly older and young birds should be avoided. All staff should be encouraged to observe sensible practices such as foot baths and vehicle disinfection.

When sheds are de-populated they should undergo a thorough cleanout by removing all litter then washing and disinfecting all equipment, paying particular attention to feed lines, feed silos, drinkers and medication tanks. Use an insecticide to eliminate carrier insects such as beetles and mites.

Rearing Pullets

Day old chicks

Day old chicks are transported in specialised vehicles that maintain the optimal environmental conditions for the newly hatched chick during delivery.

Chicks ultimately destined for the alternative production systems of barn or free range should be reared on the floor as they will be more adapted to the final environment. The floor should be well covered with litter and feeders and drinkers spaced appropriately according to the proposed heating method.

Before the chicks arrive set up the brooding area and check that all equipment is working properly. Heat the brooding area well beforehand to 35^0C and check that there are no drafts.

Place the newly arrived chicks quickly and evenly over the brooding area.

Over the brooding period, the brooding temperature, space requirements, and feeder and drinker requirements rapidly change as the young chick grows. Specific recommendations for each are detailed in the following paragraphs and tables.

Floor space requirements

Day old chicks can be placed at a density of 50/m^2 reducing to 15/m^2 by four weeks of age. Floor space requirements at various ages are summarised in Table 1.

Feed space requirements

Feed space is critical in getting chicks off to a good start and maintaining chick uniformity. Additional chick feed pans are advisable in the first week and should be placed on paper so that the chicks can easily find feed. As the young pullet grows, additional feeding space is required. Feeding space requirements are detailed in Table 1 for various ages. Feeder height should be regularly adjusted to bird height to minimise feed wastage.

Drinker space requirements

Drinking space requirements are provided in Table 1. Similarly to floor and feed space, drinker space requirements change as the young pullet ages. Additionally, drinker height needs to be raised as the pullet ages so that water is not spilt causing wet litter problems.

Table 1: Floor, feed, and drinker space requirements for young pullets.

Pullet Age	Floor Space	Feed Space	Drinker Space
1-2 weeks	20-30/m2	2.5-3.5cm	1 bell/250
2-6 weeks	15/m2	3.5-4cm	1 bell/200
6-18 weeks	11-13/m2	4.5-7.5cm	1 bell/125

Temperature requirements

As the young chick grows, feather development begins, and the chick is able to maintain its own body temperature by six weeks of age. Brooder house temperatures are reduced during this period to stimulate appetite and feather growth. Recommended brooder house temperatures are summarised in Table 2.

Table 2: Recommended Temperatures at Chick Level.

Age	Temperature °C
Day 1	35
Days 2-4	33-34
Days 5-7	30-32
Week 2	27-29
Week 3	25-26
Week 4	20-23
Week 5 and after	18-20

Litter

Some sort of floor material is required to prevent chicks from slipping on smooth surfaces potentially causing permanent damage to their legs. For cage rearing use brown paper or newspaper for the first three days then remove and let the chicks adjust to the wire floor. For floor rearing, use wood shavings or a similar material. Use newspaper under scratch trays and feeders for three days so that chicks can distinguish between feed and litter.

Brooding period

The brooding period is one of the most important parts of successfully rearing pullets. It is very important to have the best conditions possible to get the chicks off to a good start. The lay out of the brooding area will vary depending on the type of heating used and the number of chicks required to be brooded. Typical brooding set ups for small and large numbers of chicks are shown in Figure 1 to indicate the placement of drinkers and feeders relative to the heating source.

Figure 1: Typical brooding set up for small and large batches of day old chicks.

The behaviour of the chicks, and their distribution, can be used as a guide to their comfort. Chicks should be evenly spread out as in the figures above. If they are concentrated under the heat source and noisy, they are too cold. If they are concentrated around the brooder surrounds, they are too hot, and if they are concentrated in one area, there may be a draught.

Pullet rearing program

Aim

A successful rearing program will produce a uniform flock of pullets of correct body weight and sexual maturity at the time of housing in the laying facility and will ensure the flock can perform to its genetic capabilities.

Growth and development

Over the rearing period the day old chick of about 35g on arrival will grow into a young pullet about 1450g in weight and approaching sexual maturity. During this growing period it is important to monitor the body weight of your pullets and their uniformity on a regular basis so that the flock

remains on the recommended weight for age targets. This is achieved by both nutrition and lighting programs.

The weight for age targets are different for each of the Bond layers and specific information on each layer is provided in the respective Performance Guide. Body weights may vary slightly depending on climate and housing during rearing.

An example of body weight for age targets are shown in Table 3.

Table 3: Typical recommended body weight targets by pullet age.

Age (weeks)	Body weight (g)
1	75
2	130
3	195
4	275
5	367
6	475
7	583
8	685
9	782
10	874
11	961
12	1043
13	1123
14	1197
15	1264
16	1330
17	1400
18	1475
19	1555
20	1640

Flock Uniformity

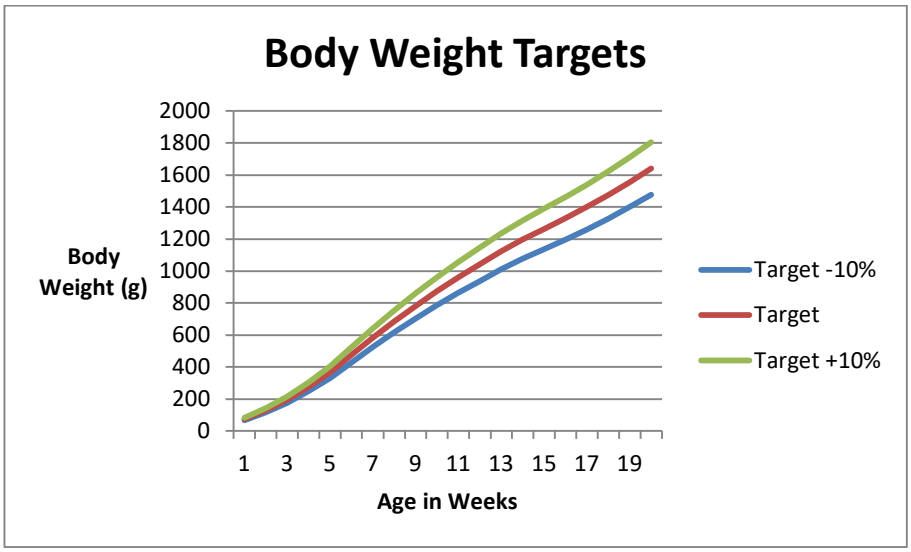
Flock uniformity is extremely important in rearing good layers. A uniform flock at the time of movement to the laying house will have 80-85 % of the pullets within ± 10% of the flock average weight which should be close to the recommended target weight.

During rearing, especially in young ages (3-10 weeks), uniformity will typically be less than 80% but will improve as the flock increases in age.

Poor uniformity is likely to provide management problems and prevent the flock from performing to expectation. Overweight pullets coming into lay may result in poorer feed conversion and large eggs too early with the potential result of picking and cannibalism. Underweight pullets may be dominated by larger pullets and will come into lay later with small eggs.

Figure 2 provides a graphical representation of the above target body weights together with body weights ± 10% of the target weight. For a uniform flock 80-85% of the pullets weighed must be within the enclosed area.

Figure 2: Typical target body weights and 10% margin to provide a uniformity of 80%.



To get an accurate picture of the flock average bodyweight and uniformity, a sample of birds should be weighed regularly from about six weeks of age. The sample should genuinely reflect the total flock. Select two areas within the flock and pen a group of birds in those areas. Weigh all the birds in each pen individually and aim for a total bird count of 60-100 birds. Calculate the average weight and uniformity.

Should target body weights or uniformity not be achieved then it is important to take immediate remedial action. If target weights are not being achieved then nutrition or lighting programmes might need to be adjusted. For overweight birds reduce feed intake but watch uniformity. For underweight birds increase feed intake or lighting programs but again watch uniformity.

Minor uniformity problems may be improved by feed intake measures or lighting changes, but for severe uniformity problems the flock might need to be graded into two flocks.

Nutrition during rearing

Feeding during rearing aims to provide the essential nutrients to allow the pullet to grow as expected and then, ultimately, perform to expectation in the laying phase. Feed types, their nutrient specifications, particle size and changeover times all need to be considered in a good feeding program.

Recommended Feeding Program

The recommended feeding program for Bond layers is detailed in Table 4. This program uses three feeds – chick starter, pullet grower and pre-layer. As the pullet grows, intake increases and generally so does feed particle size. Poultry become used to their feed and dislike changes. At the time of feed changeover, as particle size increases, be vigilant for changes in intake and its consequences.

Table 4: Recommended Feeding Program.

Pullet Age	Feed Type
0 – 8 weeks	Chick starter
8 – 16 weeks	Pullet grower (if on target body weight at 8 wks)
16 weeks	Pre-layer

Chick Starter

Chick starter is the highest nutrient specification feed in the feeding program. Young chicks have small intakes and require a small particle size. A recommended chick starter ration specification appears in Table 5.

Table 5: Recommended Chick Starter Ration Specification.

Metabolisable Energy (kcal)	2900
Metabolisable Energy (MJ)	12
Crude Protein (%)	21
Methionine (%)	0.48
Methionine/Cystine (%)	0.83
Digestible M/C (%)	0.68
Lysine (%)	1.20
Digestible Lysine (%)	0.98
Isoleucine (%)	0.83
Digestible Isoleucine (%)	0.68
Tryptophan (%)	0.23
Threonine (%)	0.80
Calcium (%)	1.05
Phosphorus – total (%)	0.75
Phosphorus – available (%)	0.48
Sodium (%)	0.16
Chlorine (%)	0.16
Linoleic Acid (%)	1.40

Pullet Grower

Grower feeds are generally lower in nutrient specification because intakes are increasing. Particle size can also increase towards the final particle size of the intended layer ration. A recommended pullet grower ration specification is shown in Table 6.

Table 6: Recommended Pullet Grower Ration Specification.

Metabolisable Energy (kcal)	2800
Metabolisable Energy (MJ)	11.7
Crude Protein (%)	18.5
Methionine (%)	0.38
Methionine/Cystine (%)	0.67
Digestible M/C (%)	0.55
Lysine (%)	1.00
Digestible Lysine (%)	0.82
Isoleucine (%)	0.70
Digestible Isoleucine (%)	0.58
Tryptophan (%)	0.21
Threonine (%)	0.70
Calcium (%)	1.00
Phosphorus – total (%)	0.70
Phosphorus – available (%)	0.45
Sodium (%)	0.16
Chlorine (%)	0.16
Linoleic Acid (%)	1.40

Pre-Layer

Pre-layer rations are generally fed in the few weeks before the commencement of lay. Some nutrients in these rations are increased to support the commencement of lay – increased calcium for egg shell production and increased natural carotenoids for yolk pigmentation. A recommended pre-layer ration specification is shown in Table 7.

Table 7: Recommended Pre-Layer Ration Specification.

Metabolisable Energy (kcal)	2750
Metabolisable Energy (MJ)	11.5
Crude Protein (%)	17.5
Methionine (%)	0.36
Methionine/Cystine (%)	0.68
Digestible M/C (%)	0.56
Lysine (%)	0.85
Digestible Lysine (%)	0.70
Isoleucine (%)	0.60
Digestible Isoleucine (%)	0.50
Tryptophan (%)	0.20
Threonine (%)	0.60
Calcium (%)	2.00
Phosphorus – total (%)	0.65
Phosphorus – available (%)	0.45
Sodium (%)	0.16
Chlorine (%)	0.16
Linoleic Acid (%)	1.00

Feed Supplements

Supplements to the above general feed nutrient specifications ensure the necessary supply of essential vitamins, trace elements, antioxidants, and carotenoids for yolk pigmentation. Recommended feed supplements are given in Table 8.

Table 8: Recommended Feed Supplements.

Supplement (per kg)	Chick Starter	Pullet Grower	Pre-Layer	Layer
Vitamin A (IU)	10000	8000	8000	10000
Vitamin D_3 (IU)	3000	2400	2400	3000
Vitamin E (mg)	40*	32*	32*	100*
Vitamin K_3 (mg)	3	2.4	2.4	3
Vitamin B_1 (mg)	2.5	2	2	2.5
Vitamin B_2 (mg)	7	5.6	5.6	7
Vitamin B_6 (mg)	5	4	4	5
Vitamin B_{12} (mcg)	20	16	16	20
Pantothenic Acid (mg)	12.5	10	10	12.5
Nicotinic Acid (mg)	50	40	40	50
Folic Acid (mg)	1.5	1.2	1.2	1.5
Biotin (mcg)	150	120	120	150
Choline total (mg)	1490	1296	1296	1305
Antioxidants (mg)	100-150*	100-150*	100-150*	100-150*
Coccidiostat	As required	As required		
Manganese (mg)	75	75	75	75
Zinc (mg)	80	80	80	80
Iron (mg)	60	60	60	60
Copper (mg)	10	10	10	10
Cobalt (mg)	0.25	0.25	0.25	0.25
Iodine (mg)	1.5	1.5	1.5	1.5
Selenium (mg)	0.3	0.3	0.3	0.3

*Depending on feed fat level.

Lighting programs

Lighting programmes, in conjunction with feeding programs, greatly assist in rearing pullets that are of the correct body weight, uniformity and sexual maturity at the time of housing in the laying shed. The recommended lighting program appears in the Table 9 below.

Table 9: Recommended lighting program during rearing.

Pullet Age	Lighting
Days 1 – 5	24 hours with 15 minute blackout training
Days 5 - 10	23 hours
Day 11 to 16 weeks	14 hours

Increases in the light period stimulate breeding activity. It is therefore important to only increase light, and stimulate egg laying, when the pullet is of the correct body weight and approaching sexual maturity sometime after 16 weeks.

To assist young pullets to meet target body weights night feeding can be used and has proved very successful in rearing all Bond layers. Night feeding, provided the birds get at least 3 hours of darkness before and after the night light, will have little impact on stimulating sexual maturity. If night feeding is used, then two hours feeding between 11pm and 1am is recommended.

After the initial period of full light, the ongoing light period (including night feeding) should be sufficient for the young pullet to consume the necessary feed to remain on the specified growth target weight.

Light intensity should be 10 – 15 lux during rearing.

Vaccinations, Medications, and Treatments

The recommended vaccinations, medications and treatments during the rearing period are detailed in Table 10.

Table 10: Recommended vaccinations, medications and treatments for rearing pullets.

Vaccination/Treatment	Age
Mareks*2	Day Old
Infectious Bronchitis	Day Old
Fowl Pox	Day Old
Beak Trim	Day Old
Newcastle Disease	3 weeks
Worming	6 weeks
Beak Trim	10 weeks
Cholera/Coryza	10 weeks
Fowl Pox	10 weeks
Avian Encephalomyelitis	11 weeks
ILT	13 weeks
Infectious Bronchitis	14 weeks
Worming	15 weeks

When vaccinating pullets always follow the manufacturer's directions and do not vaccinate birds that are stressed or unwell.

Where respiratory problems are encountered, vaccination for MG and/or MS is recommended.

All Bond layers have been bred for good behavioural characteristics and a calm temperament. As a result of this, beak trimming is not required but is detailed in the treatment/vaccination program as an option. If beak trimming is undertaken, only a hot tip trim at day old, with a possible touch up at ten weeks is recommended. These options are depicted in Figure 3.

Figure 3: Block trim (L - not required), Hot tip trim (M – optional), No trim (R – recommended).

Under certain environmental conditions, or management failures such as high light intensity, bird overcrowding, and failure to provide sufficient perches, dust bathing areas, and secluded nests in appropriate locations, the bad behaviours of cannibalism and feather pecking can occur.

Moving Pullets

When moving pullets to the laying facility it is important to minimise stress so that there is no disruption to normal growth or sexual maturity.

During moving it is not uncommon for birds to lose up to 15% of their body weight due to de-hydration. To continue growth and maturity, feed and water are important. Ensure feeders and feed type and consistency are similar to those used in rearing. Similarly, waterers should be similar to rearing, or if not, ensure that the birds quickly locate the new drinkers and that plenty of water is available.

To prevent smothering in new or unfamiliar surroundings, provide light all night for the first day or two after moving.

Management of Layers

Housing

Layers can be housed and produce eggs under the cage, barn or free range production systems. Each of these systems has its own merits, disadvantages, and costs of production.

Shed Climate

Regardless of the intended production system, the shed climate is important in securing top production from the newly housed layers, but will of course vary depending on the chosen system. Cage systems can allow full environment control. Barn systems, including aviary systems, may have

significant environment control. Free range systems generally have only limited control over the environment.

Regardless of the amount of control over the shed environment, Bond layers will perform exceptionally well.

Initial Management

The initial management of your layers after moving should be focused on minimising stress associated with the new environment. Ensure that the birds are eating and drinking as and when required and that no stress related, or other bad behaviour, is being exhibited.

Except for caged layers, birds should be actively investigating their new surrounds and equipment (perches and nests).

Bird Training

Once the birds have settled in (generally in a couple of days), training should commence for barn or free range egg production.

It is important to ensure eggs are laid in the supplied nests and not on the floor. Floor eggs quickly become contaminated and are a health risk to consumers. Additionally, birds laying floor eggs are exposed to picking and cannibalism – both of which are undesirable behaviours.

Nests should be appropriately placed and have good and easy access. Perches are of great assistance in achieving this and encouraging good bird behaviour. Perches should be plastic or metal for easy cleaning and preferably be round with a diameter of about 3.5cm. They should be placed 30-40 cm apart so that birds on adjacent perches cannot reach to feather or vent peck.

Birds should be adequately trained for nesting behaviour before training for ranging behaviour as this generally results in less floor eggs, or the laying of eggs outside the shed. It is worth noting that the Australian Free Range definition allows birds to be confined while nest training is occurring.

Ranging behaviour should be encouraged as soon as nest training is completed. This is done by utilising the bird's inquisitiveness and avoiding stress and obstacles to this behaviour. Ensure significant and utilisable access to outside pasture is provided. Outside pasture should be lush and green but cut relatively short to prevent gut impaction. Plenty of shade is very important for outside foraging on sunny days.

Lighting Programs

Lighting programs in the layer facility should be designed to stimulate consistently good egg production. To do this the day length should be increased by at least an hour at sexual maturity to bring the birds into production. After this increase, the length of day light provided should never be decreased.

Lighting programs in closed sheds are relatively straightforward as initial increases in day length to 15/16 hours on housing are all that are required. Increases of half an hour each, a week apart, will

increase lighting to 15/16 hours from the rearing lighting of 14 hours. Light intensity should be 30-50 lux depending on layer facility type.

For open houses, lighting programs should also aim to increase day length at housing time by a minimum of one hour. To achieve this, the maximum day length at your location needs to be considered and maximum day lengths for each Australian capital city are indicated in Table 11.

Table 11: Maximum day length for Australian capital cities.

Australian Capital City	Maximum Day Length (hours & minutes)
Perth	15.15
Adelaide	15.31
Hobart	16.21
Melbourne	15.50
Brisbane	14.53
Sydney	15.25

Regardless of rearing period day length, which of necessity may be higher than the recommended 14 hours, laying house day length must be increased to stimulate production. If rearing period day length is more than an hour less than the maximum day length, increase day length to the maximum day length by half hour increments a week apart. If rearing period day length is close to maximum day length, increase laying house day length by half hour intervals to maximum day length plus an hour.

It is extremely important that lights remain on in the laying house until all birds return from outside foraging at dusk as they will not enter a dark house.

In open houses, light intensity should approximate bright daylight which is 50-60 lux.

Nutrition

The performance capabilities of the Bond layers are excellent but to achieve these capabilities good nutrition and feed specifications are required throughout the productive life of the layer.

Feed specifications

Typical layer rations are high in protein (17-18%) at the commencement of lay and are detailed in Table 12 for a feed containing 11.4 MJ or 2720 Kcal metabolisable energy per kg of feed.

Table 12: Recommended nutrient levels (per kg of feed) for initial (Phase 1) laying ration.

Nutrient	Daily Feed Consumption		
	105g	**110g**	**115g**
Crude Protein (%)	18.7	17.8	17.0
Methionine (%)	0.38	0.36	0.35
Methionine/Cystine (%)	0.71	0.68	0.66
Digestible M/C (%)	0.59	0.56	0.54
Lysine (%)	0.83	0.79	0.76
Digestible Lysine (%)	0.68	0.65	0.62
Isoleucine (%)	0.59	0.62	0.65
Digestible Isoleucine (%)	0.49	0.51	0.53
Tryptophan (%)	0.21	0.20	0.19
Threonine (%)	0.61	0.58	0.56
Calcium (%)	3.90	3.75	3.60
Phosphorus, total (%)	0.57	0.55	0.52
Phosphorus, avail (%)	0.40	0.38	0.36
Sodium (%)	0.16	0.15	0.15
Chlorine (%)	0.16	0.15	0.15
Linoleic Acid (%)	1.90	1.80	1.75

Phase feeding

As with most layers that produce large eggs quickly, the Bond layers may produce eggs that are too large for your market later in their productive life. Phase feeding fine tunes ration formulations to bird performance, thereby reducing ration costs, limiting egg size increase, and improving shell quality. The initial laying ration, also called a phase 1 ration, is generally fed to 45 weeks of age and is detailed in Table 12 above. Typical phase 2 and 3 rations, and the time of their introduction, are presented in Tables 13 and 14 for feeds containing 11.4 MJ or 2720 Kcal metabolisable energy per kg of feed.

Table 13: Recommended nutrient levels (per kg of feed) for Phase 2 laying ration.

Nutrient	Daily Feed Consumption		
	105g	**110g**	**115g**
Crude Protein (%)	17.50	16.70	16.00
Methionine (%)	0.36	0.35	0.33
Methionine/Cystine (%)	0.68	0.65	0.62
Digestible M/C (%)	0.56	0.54	0.51
Lysine (%)	0.79	0.75	0.72
Digestible Lysine (%)	0.65	0.62	0.59
Isoleucine (%)	0.52	0.55	0.58
Digestible Isoleucine (%)	0.43	0.45	0.47
Tryptophan (%)	0.19	0.18	0.17
Threonine (%)	0.55	0.53	0.50
Calcium (%)	4.10	3.90	3.75
Phosphorus, total (%)	0.51	0.49	0.47
Phosphorus, avail (%)	0.36	0.34	0.33
Sodium (%)	0.16	0.15	0.15
Chlorine (%)	0.16	0.15	0.15
Linoleic Acid (%)	1.50	1.45	1.40

Table 14: Recommended nutrient levels (per kg of feed) for Phase 3 laying ration.

Nutrient	Daily Feed Consumption		
	105g	**110g**	**115g**
Crude Protein (%)	17.00	16.20	15.50
Methionine (%)	0.34	0.33	0.31
Methionine/Cystine (%)	0.64	0.61	0.58
Digestible M/C (%)	0.52	0.50	0.48
Lysine (%)	0.74	0.71	0.68
Digestible Lysine (%)	0.61	0.58	0.56
Isoleucine (%)	0.49	0.51	0.53
Digestible Isoleucine (%)	0.40	0.42	0.44
Tryptophan (%)	0.18	0.17	0.17
Threonine (%)	0.52	0.50	0.48
Calcium (%)	4.20	4.00	3.85
Phosphorus, total (%)	0.45	0.43	0.41
Phosphorus, avail (%)	0.31	0.30	0.29
Sodium (%)	0.16	0.15	0.15
Chlorine (%)	0.16	0.15	0.15
Linoleic Acid (%)	1.15	1.10	1.05

Phase 2 laying rations should be fed from around 45 weeks of age to 65 weeks of age, after which the phase 3 ration is fed to the end of productive life.

Egg shell quality generally deteriorates as layers age. This is because the bird has a finite capability to metabolise calcium (the key ingredient of shell) and as the eggs become larger, the shells become

thinner. Phase feeding (above) will assist with shell quality as this management tool will restrict the increase in egg size.

Grit

Grit of various forms (shell, calcium chip) may assist with calcium uptake and metabolism and is recommended to be fed from around 60 weeks of age to all layers.

For free range layers, grit should be available from the commencement of ranging to assist the gizzard to break down fibre eaten during ranging. Grit will thus assist in preventing gut impaction.

Water

Cool drinking water free of contaminants is a requirement for consistent egg production. Cool drinking water is extremely beneficial during periods of high temperature and heat stress as it assists with evaporative cooling during the panting process, and prevents de-hydration during panting. Cool drinking water also assists with maintaining feed consumption during high temperature periods.

Indicative water consumption is shown in Table 15. With increasing temperature water consumption increases.

Table 15: Daily Water Consumption Guide – 1000 pullets at 20°C

Age	Litres
Day Old – 2 weeks	20-40
4	50
6	70
8	90
10	100
12	115
14	130
16	140
18	150
20	170
During Production	230-260

Minimum water quality standards are shown in Table 16. For accurate water testing it is better to conduct repeated sampling at different places and times.

Table 16: Minimum water quality standards.

Bacteria per ml	10-100
E.coli per litre	Nil
Organic substances (mg/l)	1
Nitrates (mg/l)	0-15
Ammonia (mg/l)	Nil
Iron (mg/l)	0.3
Manganese (mg/l)	0.1
Copper (mg/l)	1
Zinc (mg/l)	5
Calcium (mg/l)	75
Magnesium (mg/l)	50
Sulphates (mg/l)	200
Total salts (mg/l)	0-500
pH	6.8-7.5

Disease Control

Unhealthy birds will not produce satisfactorily. The major determinant of successful disease control is proper vaccination during the rearing of pullets coupled with good farm quarantine and hygiene. However, vigilance of flock performance, flock behaviour and mortality changes should be on-going. Any changes should be immediately investigated, and where necessary, veterinary help sought.

Parasites

There are several parasites that can affect poultry. These may be internal or external.

Internal parasites include the *Eimeria* species which cause coccidiosis, and various worm species. Coccidiosis can be prevented by early vaccination, or by coccidiostats being included in starter and grower feed, both of which allow the bird to develop immunity. Worming with a suitable product is usually carried out during both rearing and lay.

External parasites include mites, lice, and ticks in some areas. Restricting access by wild birds will assist in preventing infection by lice and mites. Regular inspection of both birds and nests will determine if infection is present. Chemical treatment may be required to eradicate these parasites. If chemicals are used be aware of any withholding periods.

High temperature management

Bond layers, being consistently bred over many years in open sided shedding, are genetically adapted to the Australian environment of high temperatures.

If cool drinking water, shade and roof sprinklers are provided, then it is unlikely that any mortality due to heat stress will occur at temperatures up to 45^0C, although egg numbers and egg size may be reduced if these temperatures are prolonged.

There are a number of management practices to minimise heat effects on egg numbers and egg size. Cool drinking water is a must as this assists in both the bird's self cooling and in consuming and digesting feed. As feed intake is reduced in hot weather, upgrading feed specifications will assist the layer to consume the necessary nutrients in a lower volume of feed. In addition to increasing feed specifications, or where this is not possible, feeding later in the day, or at night, will allow the layer to consume more feed in the cooler part of the day. Night feeding will improve the colour and quality of the egg shell.

Summary

The Bond layers have been scientifically bred in Australia in shedding that mimics the conditions of free range and barn egg production, and as a consequence are capable of exceptional performance in these conditions with correct management.

You will provide the management that enables the Bond layers to achieve their capability and we trust that this guide will assist you in that task and enable you to produce pullets similar to those in the following photograph.

Contact details

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