Introduction

Many years of genetic research have produced the Bovans Goldline, a docile, robust, colour-sexable brown egg layer that delivers large numbers of good quality eggs, is strong and shows a good appetite. These highly favourable genetic characteristics can only be fully realised when the bird is provided with proper management, which includes, but is not limited to, good quality feed, good housing and proper management practice.

The purpose of this Management Guide is to help the producer to gain the best possible results for their investment. This will be achieved by providing conditions in which the Bovans Goldline can thrive. The information supplied in this publication is based on the analysis of extensive research and field results, produced over time and with many years of experience.

We do recognize that over time, many egg producers have developed their own management programmes, based on specific housing-types, feed, market conditions, and other factors. These individual management techniques will also be the result of experience – and may also work very well for the Bovans Goldline. Therefore do not hesitate to use your own experience in conjunction with the guidelines in this publication – and of course, do not hesitate to consult your Joice and Hill representative who will be happy to help in any way they can.

Joice and Hill POULTRY LIMITED

Warranty disclaimer

The information supplied in this guide is based on many actual flock results obtained under good environmental and management conditions. It is presented as a service to our customers and should be used as a guide only. It does not constitute a guarantee or warranty of performance in any way.

The data contained in this guide should therefore be regarded not as a specification of standards but as performance objectives. All the programmes outlined in this text are supplied as recommendations only and should be modified to match specific circumstances according to the situation.

Our technical staff are of course available to assist you in determining the proper programme for your poultry operation. Please do not hesitate to contact us if you have any queries.

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Performance

Performance summary

Rearing Period (0-17 wks)

Liveability (%)	98
Body weight at 5 wks (g)	360
Body weight at 17 wks (g)	1430
Feed Consumption per bird 0-17 wks (kg)	6

Laying Period (17-72 wks)

Age at 50% production (days)	146
Peak production (%)	94.3
Feed consumption as from 140 days of age	
Per bird per day (g) until 72 wks	112.5
Liveability (17-72 wks) (%)	95
Bodyweight at 72 wks (g)	1990

	Age in weeks			
	68	72	76	80
No eggs per Hen Housed	293	313	332	350
Average egg weight (g)	63.1	63.3	63.6	64.0
Egg mass HH (kg)	18.5	19.8	21.1	22.4
Feed conversion	2.18	2.19	2.2	2.21
Liveability	95.4	95	94.6	94.2

Performance data rearing period

Age (weeks)	Age (days)	Type of feed	Feed Intake (g/day)	Feed cum (kg)	Body weight min (g)	Body weight max (g)
1	0→7	Starter	11	0.1	60	68
2	8→14		17	0.2	120	130
3	15→21		25	0.4	190	210
4	22→28		32	0.6	275	305
5	29→35	Grower	37	0.9	360	390
6	36→42		42	1.1	450	480
7	43→49		46	1.5	540	570
8	50→56		50	1.8	630	660
9	57→63		54	2.2	720	755
10	64→70		58	2.6	810	845
11	71→77	Developer	61	3	900	940
12	78→84		64	3.5	1000	1040
13	85→91		67	3.9	1095	1140
14	92→98		70	4.4	1180	1230
15	99→105		73	4.9	1265	1320
16	106→112		76	5.5	1350	1410
17	113→119	(Pre) Lay	80	6	1430	1505
18	120→126		84	6.6	1500	1600

Performance data laying period

Weeks	%HD std	Egg Size act	Daily EMO std (g)	Daily Feed act (g)	Daily FCR std (g)	Egg HH act
18	3.0	45.4	1.4	87	63.88	0
19	14.0	47.4	6.6	97	14.62	1
20	35.0	49.4	17.3	103	5.96	4
21	64.0	51.9	33.2	109	3.28	8
22	85.0	54.1	46.0	112	2.44	14
23	92.0	55.6	51.2	114	2.23	20
24	94.0	57.1	53.7	116	2.16	27
25	94.7	58.1	55.0	117	2.13	34
26	95.0	58.9	56.0	118	2.11	40
27	95.0	59.6	56.6	118	2.08	47
28	94.7	60.3	57.1	118	2.07	53
29	94.5	60.9	57.6	118	2.05	60
30	94.3	61.4	57.9	118	2.04	66
31	94.1	61.7	58.1	118	2.03	73
32	93.9	62.0	58.2	118	2.03	79
33	93.6	62.3	58.3	118	2.02	86
34	93.3	62.6	58.4	118	2.02	92
35	93.0	62.9	58.5	118	2.02	99
36	92.8	63.2	58.6	117	1.99	105
37	92.5	63.5	58.7	117	1.99	112
38	92.3	63.7	58.8	117	1.99	118
39	92.0	63.9	58.8	117	1.99	124
40	91.7	64.0	58.7	117	1.99	130
41	91.4	64.1	58.6	117	2.00	137
42	91.1	64.2	58.5	117	2.00	143
43	90.8	64.3	58.4	117	2.00	149
44	90.5	64.4	58.3	117	2.01	155
45	90.2	64.5	58.2	117	2.01	162
46	89.8	64.6	58.0	117	2.02	168
47	89.4	64.7	57.8	117	2.02	174
48	89.0	64.8	57.7	117	2.03	180
49	88.5	64.9	57.4	117	2.04	186
50	88.0	65.0	57.2	117	2.05	192

Weeks	Cumulative Egg Mass std (kg)	Cumulative Feed act (kg)	Cumulative FCR std (kg)	Mortality act	Body Weight std
18	0.0	0.6	0.1	0.0	1500
19	0.1	1.3	0.2	0.0	1600
20	0.2	2.0	11.4	0.2	1650
21	0.4	2.8	6.8	0.3	1710
22	0.7	3.5	4.9	0.4	1770
23	1.1	4.3	4.0	0.5	1800
24	1.5	5.1	3.5	0.6	1810
25	1.8	6.0	3.2	0.6	1820
26	2.2	6.8	3.0	0.7	1830
27	2.6	7.6	2.9	0.8	1840
28	3.0	8.4	2.8	0.9	1850
29	3.4	9.2	2.7	1.0	1860
30	3.8	10.1	2.6	1.0	1870
31	4.2	10.9	2.6	1.1	1880
32	4.6	11.7	2.5	1.2	1885
33	5.0	12.5	2.5	1.3	1890
34	5.4	13.3	2.5	1.4	1895
35	5.8	14.1	2.4	1.4	1900
36	6.2	14.9	2.4	1.5	1905
37	6.6	15.7	2.4	1.6	1910
38	7.0	16.6	2.4	1.7	1915
39	7.5	17.4	2.3	1.8	1920
40	7.9	18.2	2.3	1.8	1930
41	8.3	19.0	2.3	1.9	1930
42	8.7	19.8	2.3	2.0	1940
43	9.1	20.6	2.3	2.1	1940
44	9.5	21.4	2.3	2.2	1940
45	9.9	22.2	2.3	2.3	1950
46	10.3	23.0	2.2	2.4	1950
47	10.6	23.8	2.2	2.5	1960
48	11.0	24.6	2.2	2.6	1960
49	11.4	25.4	2.2	2.7	1960
50	11.8	26.2	2.2	2.8	1960

Performance data laying period

Weeks	%HD std	Egg Size act	Daily EMO std (g)	Daily Feed act (g)	Daily FCR std (g)	Egg HH act
51	87.5	65.1	57.0	116	2.04	198
52	87.0	65.2	56.7	116	2.04	204
53	86.5	65.3	56.5	116	2.05	210
54	86.0	65.4	56.2	116	2.06	216
55	85.5	65.5	56.0	116	2.07	221
56	85.0	65.6	55.8	116	2.08	227
57	84.5	65.7	55.5	116	2.09	233
58	84.0	65.8	55.3	116	2.10	238
59	83.5	65.9	55.0	116	2.11	244
60	83.0	66.0	54.8	116	2.12	250
61	82.4	66.1	54.5	116	2.13	255
62	81.8	66.2	54.2	116	2.14	261
63	81.2	66.3	53.8	116	2.15	266
64	80.6	66.4	53.5	116	2.17	272
65	80.0	66.5	53.2	116	2.18	277
66	79.3	66.6	52.8	116	2.20	282
67	78.5	66.7	52.4	116	2.22	287
68	77.7	66.8	51.9	116	2.23	293
69	76.9	66.9	51.4	116	2.25	298
70	76.1	67.0	51.0	116	2.28	303
71	75.3	67.1	50.5	115	2.28	308
72	74.5	67.2	50.1	115	2.30	313
73	73.7	67.3	49.6	115	2.32	318
74	72.9	67.4	49.1	115	2.34	323
75	72.1	67.5	48.7	115	2.36	327
76	71.3	67.6	48.2	115	2.39	332
77	70.5	67.7	47.7	115	2.41	337
78	69.7	67.8	47.3	115	2.43	341
79	68.9	67.8	46.7	115	2.46	346
80	68.0	67.9	46.2	115	2.49	350

Weeks	Cumulative Egg Mass std (kg)	Cumulative Feed act (kg)	Cumulative FCR std (kg)	Mortality act	Body Weight std
51	12.2	26.9	2.2	2.9	1960
52	12.6	27.7	2.2	3.0	1970
53	13.0	28.5	2.2	3.1	1970
54	13.4	29.3	2.2	3.2	1970
55	13.7	30.1	2.2	3.3	1970
56	14.1	30.9	2.2	3.4	1970
57	14.5	31.7	2.2	3.5	1970
58	14.9	32.4	2.2	3.6	1980
59	15.2	33.2	2.2	3.7	1980
60	15.6	34.0	2.2	3.8	1980
61	16.0	34.8	2.2	3.9	1980
62	16.3	35.6	2.2	4.0	1980
63	16.7	36.4	2.2	4.1	1980
64	17.1	37.1	2.2	4.2	1980
65	17.4	37.9	2.2	4.3	1980
66	17.8	38.7	2.2	4.4	1990
67	18.1	39.5	2.2	4.5	1990
68	18.5	40.2	2.2	4.6	1990
69	18.8	41.0	2.2	4.7	1990
70	19.1	41.8	2.2	4.8	1990
71	19.5	42.5	2.2	4.9	1990
72	19.8	43.3	2.2	5.0	1990
73	20.1	44.1	2.2	5.1	1990
74	20.5	44.8	2.2	5.2	2000
75	20.8	45.6	2.2	5.3	2000
76	21.1	46.4	2.2	5.4	2000
77	21.4	47.1	2.2	5.5	2000
78	21.7	47.9	2.2	5.6	2000
79	22.0	48.6	2.2	5.7	2000
80	22.4	49.4	2.2	5.8	2000

Classification of Eggs

% Eggs per weight class at given weight

Average egg weight (g)	Percentage of eggs in weight class			
	XL >73	L 63-73	M 53-63	S <53
45	0	0	1	99
46	0	0	2	98
47	0	0	4	96
48	0	0	8	92
49	0	0	13	87
50	0	0	20	80
51	0	0	29	71
52	0	0	40	60
53	0	0	50	50
54	0	1	59	40
55	0	2	67	31
56	0	4	73	23
57	0	7	76	17
58	0	12	76	12
59	0	18	74	8
60	0	25	70	5
61	0	32	64	4
62	1	41	56	2
63	1	49	49	1
64	3	55	41	1
65	5	61	33	1
66	7	67	26	0
67	11	69	20	0
68	16	69	15	0
69	21	67	12	0
70	28	64	8	0

% Eggs per class at a given age at breed std egg weight

Weight Class	Weight (g)	Age (weeks)					
		30	40	50	60	70	80
XL	>73	0.4%	3.0%	5.0%	8.0%	12.0%	16.5%
L	63-73	36.2%	55.0%	61.0%	65.0%	67.0%	67.0%
M	53-63	59.8%	41.0%	33.0%	27.0%	21.0%	16.5%
S	<53	3.6%	1.0%	1.0%	0.0%	0.0%	0.0%

Cumulative eggs per class to 72 weeks when managed for a certain average egg weight (HH basis)

Weight Class	Weight (g)	Average Egg Wt (g) to 72 wks					
		67g	66g	65g	64g	63g	62g
XL	>73	17.4%	13.5%	9.8%	6.8%	4.4%	2.7%
L	63-73	56.7%	56.2%	54.6%	51.7%	47.6%	42.5%
M	53-63	23.5%	27.3%	31.5%	36.4%	41.6%	46.7%
S	<53	2.4%	3.0%	4.2%	5.2%	6.5%	8.1%

Nutrition

UK cage recommendations

Diet	Starter	Grower	Developer	Prelay[2]
Age (weeks)	0 to 4	4 to 9	9 to 17	17 to 1st egg
Production (%HD)				
Feed intake (g/b/day)[1]				79 to 97
Bodyweight (g)	35 to 290	290 to 690	690 to 1405	1405 to 1600
Crude Protein (%)	20	18	16	16.5
ME (kcal/kg)	2975	2875	2750	2750
ME (MJ/kg)	12.4	12.0	11.5	11.5
Linoleic Acid	1.50	1.25	1.25	1.25
Methionine	0.54	0.45	0.35	0.38
Met + Cys	0.92	0.79	0.63	0.68
Lysine	1.20	1.00	0.78	0.80
Arginine	1.20	1.10	1.00	0.95
Tryptophan	0.23	0.19	0.15	0.15
Threonine	0.78	0.65	0.51	0.52
Ca	1.00	0.95	0.90	2.20
av Phosphorus	0.50	0.48	0.45	0.42
Sodium (%)	0.16	0.15	0.15	0.15

Notes

1. Lower ambient temperatures increase feed consumption through greater energy requirement.
2. When birds start to lay early change to layer ration more quickly or do not use prelay.
3. For cage flocks with good bodyweight, good feed intake and a smaller egg size requirement change to Layer 2 diet before peak. Ca levels can be adjusted down until the birds reach 40+ weeks.

Diet	Layer 1[3]	Layer 2[4]	Layer 3
Age (weeks)	1st egg to 28	28 to 60	61 to 72
Production (%HD)	Peak	to 80%	<80%
Feed intake (g/b/day)[1]	115	118	117
Bodyweight (g)	1600 to 1800	1800+	
Crude Protein (%)	17	16.25	15.25
ME (kcal/kg)	2800	2800	2800
ME (MJ/kg)	11.7	11.7	11.7
Linoleic Acid	1.60	1.25	1.10
Methionine	0.41	0.38	0.34
Met + Cys	0.68	0.67	0.63
Lysine	0.85	0.80	0.74
Arginine	1.07	1.04	0.95
Tryptophan	0.19	0.18	0.17
Threonine	0.56	0.53	0.50
Ca	4.00	4.10	4.30
av Phosphorus	0.40	0.33	0.30
Sodium (%)	0.19	0.18	0.18

4 Age of ration change is approximate and should be done in line with bodyweight, egg size requirements, egg mass output, environmental conditions and other management criteria.

5 Amino acids listed are in the form of total amino acid.

6 Further in-depth guidance on nutritional programmes can be obtained from your breed representative.

UK free range recommendations

Diet	Starter	Grower	Developer	Prelay[2]
Age (weeks)	0 to 4	4 to 10	10 to 17	17 to 1st egg
Egg size at change to next diet				1st egg
Bodyweight (g)	35 to 290	290 to 690	690 to 1405	1405 to 1600
Crude Protein (%)	20.0	18.0	16	16.5
Crude Fibre (%)	2.0-3.5	2.5-4.0	4.0-6.0	5.0-7.0
ME (kcal/kg)	2975	2875	2750	2750
ME (MJ/kg)	12.4	12.0	11.5	11.5
Linoleic Acid	1.50	1.25	1.25	1.25
Methionine	0.54	0.45	0.35	0.38
Met + Cys	0.92	0.79	0.63	0.68
Lysine	1.20	1.00	0.78	0.80
Arginine	1.20	1.10	1.00	0.95
Tryptophan	0.23	0.19	0.15	0.15
Threonine	0.78	0.65	0.51	0.52
Ca	1.00	0.95	0.90	2.20
av Phosphorus	0.50	0.48	0.45	0.42
Sodium (%)	0.16	0.15	0.15	0.15

Notes

1. Lower ambient temperatures increase feed consumption through greater energy requirement.
2. When birds start to lay early changer to layer ration more quickly or do not use prelay.
3. Age of ration change is approximate and should be done in line with bodyweight, egg size requirements, egg mass output, environmental conditions and other management criteria.

Diet	Early Lay[5]	Layer 1[3]	Layer 2
Age (weeks)	1st egg to 26	1st egg to 45	45+
Egg size at change to next diet	61-62g	65-66g	
Bodyweight (g)	1600 to 1800	1600 to 1850	1850+
Crude Protein (%)	17.5	17.0	16.25
Crude Fibre (%)	5.0-8.0	6.0-8.0	6.0-8.0
ME (kcal/kg)	2800	2800	2800
ME (MJ/kg)	11.7	11.7	11.7
Linoleic Acid	2.00	1.60	1.25
Methionine	0.43	0.41	0.38
Met + Cys	0.75	0.68	0.67
Lysine	0.86	0.85	0.80
Arginine	1.10	1.07	1.04
Tryptophan	0.19	0.18	0.17
Threonine	0.56	0.53	0.50
Ca	3.70	3.70-4.00	4.20
av Phosphorus	0.40	0.33	0.30
Sodium (%)	0.19	0.19	0.18

4 Amino acids listed are in the form of total amino acid.

5 Flocks with good uniformity and intake may be fed Layer 1 from 1st egg. This will control egg size.

6 It is important to look at floor system flock energy requirements particularly in extreme weather and in cases of poor feathering.

7 Further in-depth guidance on nutritional programmes can be obtained from your breed representative.

Suggested premix composition for commercial layers

For Commercial Layers		Rearing Period		Laying Period
		0 6 10 Weeks	10 Wks - 2% Lay	
Added trace elements mg per kg of diet				
Manganese (Mn)	ppm	60	60	70
Zinc (Zn)	ppm	60	60	60
Iron (Fe)	ppm	60	60	60
Iodine (I)	ppm	1	1	1
Copper (Cu)	ppm	8	6	8
Selenium (Se)	ppm	0.25	0.25	0.25
Cobalt (Co)	ppm	0.25	0.15	0.15
Added vitamins per kg of diet in IU or mg				
Vitamin A	IU	13.000	10.000	10.000
Vitamin D3	IU	3.000	2.000	2.500
Vitamin E	mg	25	25	20
Vitamin K3	mg	3	3	3
Vitamin B1 (Thiamine)	mg	2	2	2
Vitamin B2 (Riboflavin)	mg	5	5	5
Vitamin B6 (Pyridoxine)	mg	5	5	5
Vitamin B12	mg	0.02	0.01	0.015
Nicotinic Acid (Niacin)	mg	60	40	40
Pantothenic acid	mg	15	12	12
Folic Acid	mg	0.75	0.75	0.75
Biotin	mg	0.2	0.1	0.05
Vitamin C in hot climate or during summer time	mg			100
Total Choline requirement per kg of diet (raw materials in cluded) mg				
Choline	mg/kg	1600	1400	1400
Choline	mg/day	-	-	160
Add antioxidant				

Mixing

Trace elements and vitamins should be correctly mixed before being added to the raw materials. Premixes have to be mixed at a minimum level of 3 kg per tonne. Improper mixing or handling can be checked by dosing Manganese as a tracer.

Toxicity of some minerals

Maximum admissible levels for different minerals could be estimated as followed:

Manganese	1000 ppm
Zinc	2000 ppm
Iron	500 ppm
Iodine	300-500 ppm
Copper	300-500 ppm
Selenium	10 ppm
Potassium	2000 ppm
Magnesium	5000 ppm
Sodium	5000 ppm
Chlorine	5000 ppm
Vanadium	10 ppm due to contamination from rock phosphates

Management

Rearing period

Brooding temperature:

Age Chick level temperature	
Age	Chick level temerature
first 5 hours	32°C
5 hrs-7 days	32°C to 30°C
2nd week	30°C to 28°C
3rd week	28°C to 26°C
4th week	26°C to 24°C
5th week	24°C to 22°C
6th week	22°C to 20°C

Key Points

- The rearing environment should be clean and well disinfected. All material from the previous flock should have been removed. We recommend dusting down the unit before taking out the litter. The wet cleaning of the house and equipment is advisable and this should be allowed to dry before disinfection. Vermin and problem insects such as mite should be controlled.
- Restrict access of personnel and equipment to the rearing house, especially if they have been in recent contact with adult or older birds. This is especially important in the first few weeks of rear. Good bio-security and hygiene should be maintained at all times.
- Raise house temperature at least 24 hours before chick arrival to 29 - 31°C to ensure the equipment and floor are warm.
- Watch the behaviour of the chicks and adapt temperature accordingly to that behaviour.

Too cold

Too warm

Draught

Ideal

- Supplementary drinkers are recommended for the first few days. The water should be in the drinkers before the chicks arrive to allow it to reach ambient temperature.
- Ensure all water cleaning products are thoroughly flushed before placement.

Beak Treatment

The removal of the hooked part of the upper beak is recommended to reduce the risk of cannibalism. This is best carried out at the hatchery using IR technology but can be done on farm at 7-10 days.

Relative Humidity

A relative humidity of 60-70% is advised.

Optimum light intensity

Age	Lux	Watts/m2
0 - 7 days	Min. 20	Min. 4
7 days - 4 weeks	10	3.2
4 - 17 weeks	6	2
17 - 26 weeks	10	3.2
beyond 26 weeks	6	2

Lighting programmes and other management techniques

The lighting programme should be suitable for the production goals, system of production, condition of the flock and time of housing (see suggested light programmes page 28). In general the step down should be slow enough to allow good early body weight development.

The timing and amount of the first step up in day length is critical and should be judged on a flock by flock basis, taking account of the flock's health, bodyweight development, uniformity, age of movement to laying house, season, system of

production and production goals. The closer to 12 weeks and the bigger the day length increase, the greater the effect on maturity. Egg size is influenced by the weight at first egg but can also be effectively controlled by nutrition. Flocks pushed into to lay too early risk later production problems. We would recommend producers not to give a light increase before the following criteria are met:

- 1300g body weight
- 75% uniformity

Seasonal variation

In a controlled environment house (lightproof) the seasonal fluctuations of day length still interfere with the flock performance.

Therefore, for a windowless house, it is also necessary to adapt the standard lighting programme to the hatch season. Flocks hatched in the 'off season', with reduced day length should be light stimulated earlier than those reared in the increasing day length season.

In houses where light control is not possible, the minimum day length should not be less than the natural day length between 8 and 18 weeks of age.

Bodyweight development

- Good early growth is critical and by 5 weeks bodyweight should be as high as possible since frame and internal organ development take place in this period. The birds should be monitored for weekly growth from delivery and any negative variation to standard should be looked into. In particular the first few days of life are crucial to obtaining good development and later uniformity. Brooding temperatures, provision of ample water and fresh feed, good bio-security are all important. If necessary the stepping down of the day length should be slowed.

- 5 to 14 weeks. When the bodyweight is on or above the standard then try to obtain the same growth per week as the given standard. When bodyweight on 5 weeks of age is lower than our standard it is important to achieve standard bodyweight as quickly as possible.

- From 14 weeks onwards try to achieve a body weight as high as possible.

Uniformity

- Uniformity of body weight (+ 10% / - 10%) should be at least 70% at 10 weeks of age and at least 75% from 15 weeks onward.

Feeding

- The best possible diets should be fed in the first few weeks of life – financial input here will be rewarded with better production later in life.
- Crumbs/pelleted feed can be useful in maximising early body weight. After 6 weeks, mash is the favourable feed presentation.
- Clean water should be available at all times and care should be taken that there is provision for demand at peak times. Thorough cleaning after depletion and continuous dosing/periodic cleansing with a suitable product to maintain water standard are good practice to reduce bacterial challenge on the birds. After clean out any chemicals used to clean the water system most be thoroughly flushed through. Care should also be taken when vaccinating and no chemicals or residue should be present at this time.
- The habit of cleaning up feed in the tracks or pans should be started in the latter half of rear (see below).

Vaccination

This too is crucial to a successful flock. Consult with you veterinary surgeon as to what vaccinations will be necessary to protect your flock in rear and lay. Apply the vaccine with care to ensure that all birds receive a dose of active vaccine. Managers and staff should be given professional training. The use of proportioners and water buffers is advised. Monitor the blood titre levels of important vaccines such as IB. If the priming levels are poor, birds should re-vaccinated at least 14 days prior to receiving inactivated (injected) vaccines. It is a good idea to store sera taken 3 weeks after housing so base line titres can be obtained in case of a suspected challenge of field virus.

Laying period

Start of lay key results

In general, good performance will be obtained when the following key results are achieved:

Body Weight (g)	Approx age (weeks)		Day length (hrs)	Feed Intake (g/bird/day)
1300-1430	15-17	start light stimulation pre-lay diet	11	80
1500	18	start layer diet	12	87
1600	19	first egg	13	97
1650	20	±35% production	14	103
1650	21	65% production	14-16	109
1710	22	85% production	14-16	112
1830	26	Peak production	14-16	118

- If the projected production start is to be brought forward by stimulating closer to 1300g body weight, increases in both day length and feed amount should also be correspondingly brought forward accordingly to obtain the desired body weight, at the start of production.
- We advise to increase the day length until 16 hrs per day for floor system and 14-16 hours for intensive.

Bodyweight development

- After 16 weeks bodyweight development is critical for a good start to production; avoid unnecessary stress during this time; house the birds before 17 weeks. Give a pre-lay diet but ensure the birds on to the layer feed before production starts.
- Changes in diet are dependent on the production level, body weight and feed intake and not on age.

Feeding

- Deviation from body weights and feed amounts given on page 7 may occur due to season, housing system, feed composition, transport and health status of the flock.
- The feeding programme should be synchronised with the lighting programme to bring the flock into production in a good condition and at the desired age.
- From 16 to 21 weeks it is critical that the feed intake increases, in order to let the birds grow to achieve target bodyweight.
- It is good practice to empty the feeders during the middle part of the day. This encourages good feeding behaviour, allowing a good crop of feed to be consumed before the dark period and ensures the whole ration is consumed. Care should be taken to avoid restriction – the birds should be working for the last bit of feed in the pan, track or trough rather but not to the point it is bare. Uniform feed distribution is important in this respect and it may be necessary to feed twice in quick succession after the feeding gap.
- Ideally changes in diet, including raw materials used, should not be made between peak and 40 weeks. Ensure the flock is on a suitable diet to take them through to post 40 weeks by the time peak is reached.
- After 6 weeks, mash is the favoured feed presentation rather than crumbs or pellets. It also allows more granular forms of calcium which help provide this nutrient at the right time for shell formation.
- Insoluble fibre such as lignin and cellulose are an important part of the hen's diet and are thought to help reduce the incidence of feather pecking. Materials such as sunflower meal may be used to boost levels.
- Clean water should be available at all times and care should be taken that there is provision for demand at peak times. Thorough cleaning after depletion and continuous dosing/periodic cleansing with a suitable product to maintain water standard are good practice to reduce bacterial challenge on the birds.

Temperature

Although the laying hen can tolerate a wide range of temperature variation and still perform well, excessive fluctuations in environmental temperatures are detrimental to productivity and efficiency. At the beginning of production period the ideal house temperature is between 21-24°C, slowly increasing as the bird ages. Temperatures below 12°C and above 28°C will negatively affect performance. Lower house temperatures will increase feed consumption and lead to larger egg size. Higher house temperatures, can slow egg size increase and limit feed consumption early in lay. Higher house temperature can be utilized later in lay to control feed consumption and prevent excessive egg size.

Air quality

It is necessary to maintain good air quality - minimum ventilation rates should be maintained at all times. All areas of the house should have some level of air movement.

Light Intensity

A uniform distribution of light is recommended.

Floor system flocks may be reduced to 6 lux once peak lay has been reached.

Collecting floor eggs

It is important to start collecting floor eggs as soon as the lights in the house are switched on. This reduces the number of floor eggs and trains the birds to lay in the nest boxes.

To reduce the number of floor eggs it is also crucial to have a good nest box.

- The nest box should be free of draught
- Entrance of the nest should be clearly visible to the birds.
- Nest boxes should be easily accessible and preferable be located in the center of the house.

- To prevent floor eggs a water line should be located in front of the nest boxes.
- Open the nest boxes 7-10 days before start of production.
- When floor eggs are found just after lights go on, open the nest boxes earlier, or place small light bulbs in the center of the house and light these light bulbs ½ hour until 1 hour before normal lights go on.
- Collect floor eggs frequently, and several times per day.
- Do not disturb the birds during laying. Minimise feeding times from between 3-6 hours after lights go on.
- Diminish the number of dark spots in the house, because dark spots can increase the number of floor eggs.
- Place obstacles in places where birds continue to lay floor eggs.

General Management

Good bio-security practices should be maintained at all times. Visitors should be restricted and those that are necessary should be provided with clean boots and overalls. Hand washing should be enforced before and after contact with the livestock. Feed spills should be cleaned up promptly and the site should generally remain tidy and free from vermin refuges. Houses should be wild bird proof and pets kept from contact with the poultry.

Floor system birds should be regularly wormed. Red mite, flies and other vermin should be monitored and populations kept under control.

Management of the ranging area for free range and organic flocks is a wide and complex subject but it is crucial to success. In particular the area of close proximity to the house should be well drained and it's use rotated. Between crops it should be ideally turned and re-seeded. Fencing should be maintained in order to prevent losses to predators.

Bovans Goldline Lighting Programme

System: Floor

Age (weeks)	Age (days)	Daylength at start of week (hours)	Light Intensity	Temp °C
0	0	23	20	32
1	7	20	10	30
2	14	18		28
3	21	16		26
4	28	14	6	24
5	35	12		22
6	42	10		21
7	49	10		21
8	56	10		21
9	63	10		21
10	70	10		21
11	77	10		21
12	84	10		21
13	91	10		21
14	98	10		21
15	105	10		21
16	112	10	10	21
17	119	11		21
18	126	12		21
19	133	13		21
20	140	14		21
21	147	15		21
22	154	16		21
23	161	16		21
24	168	16		21
25	175	16	6	21

NB: This is a sample programme only and lighting programme should be matched to time of year, bodyweight and egg size requirements.

Lighting programmes are only effective in light controlled environments.

Please consult your local representative for further advice.

System: Intensive

Age (weeks)	Age (days)	Daylength at start of week (hours)	Stocking Density (sq cm per bird)	Temp °C
0	0	23	125	32
1	7	19		30
2	14	15		28
3	21	13	220	26
4	28	11		24
5	35	9		22
6	42	9		21
7	49	9		21
8	56	9		21
9	63	9		21
10	70	9	350	21
11	77	9		21
12	84	9		21
13	91	9		21
14	98	9		21
15	105	10		21
16	112	11	550 (750)	21
17	119	12		21
18	126	13		21
19	133	14		21
20	140	14		21
21	147	14		21
22	154	14		21
23	161	14		21
24	168	14		21
25	175	14		21

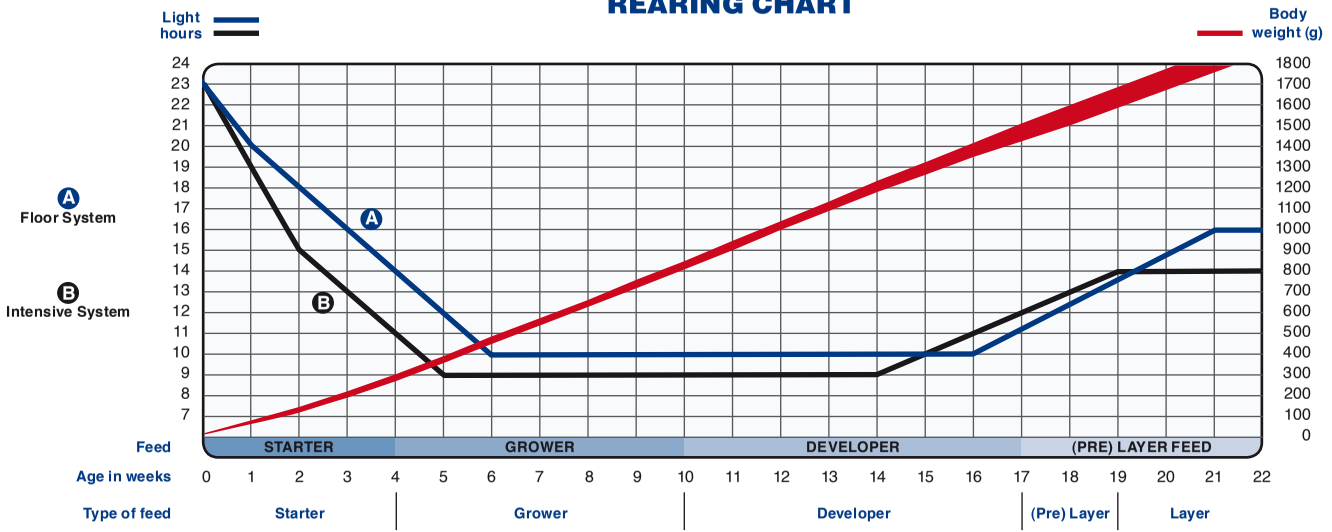
NB: Light and feed schedule should be linked to body-weight, uniformity and egg size requirements.

Flocks should be light stimulated at 1300g bodyweight. Very uniform flocks for medium egg production may be stimulated at 1250g.

Uneven or poor bodyweight flocks should be stimulated a little later and possibly fed a higher density diet for the first 4 weeks after housing.

Lighting programmes are only effective in light controlled environments

REARING CHART



Conversion Table

1 mtr	= 3.282 feet	1 foot	= 0.305 mtr
1 sq mtr	= 10.76 sq feet	1 sq foot	= 0.093 sq mtr
1 cub mtr	= 35.316 cub feet	1 cub foot	= 0.028317 cub m
1 cm	= 0.394 inches	1 inch	= 2.54 cm
1 sq cm	= 0.155 sq inch	1 sq inch	= 6.45 sq cm
1 kg	= 2.205 lbs	1 lb	= 0.454 kg
1 g	= 0.035 ozs	1 oz	= 28.35 g
1 ltr	= 0.22 gallons	1 gallon	= 4.54 ltr

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1 bird per square metre	= 10.76 square feet per bird
3 bird per square metre	= 3.59 square feet per bird
4 bird per square metre	= 2.69 square feet per bird
5 bird per square metre	= 2.15 square feet per bird
7 bird per square metre	= 1.54 square feet per bird
11 bird per square metre	= 0.98 square feet per bird
13 bird per square metre	= 0.83 square feet per bird

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1 cubic metre/kilogram/hour	= 16.016 cubic feet/lb/hour
1 cubic foot/lb/hour	= 0.0624 cubic meter/kilogram/hour

˚F = 9/5˚C + 32	˚C = 5/9 (˚F -32)	
45˚C = 113˚F	22˚C = 72˚F	10˚C = 50˚F
40˚C = 104˚F	20˚C = 68˚F	8˚C = 46˚F
35˚C = 95˚F	18˚C = 64˚F	6˚C = 43˚F
30˚C = 86˚F	16˚C = 61˚F	4˚C = 39˚F
27˚C = 81˚F	14˚C = 57˚F	2˚C = 36˚F
24˚C = 75˚F	12˚C = 54˚F	0˚C = 32˚F

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1 Joule per second = 1 Watt = Volt x Ampere

1 KJ	=	1000J
1 MJ	=	1000KJ
1 MJ	=	239 Kcal
1 Kcal	=	4.2 KJ
1 KWh	=	3.6 MJ - 860 Kcal
1 BTU	=	1055 J

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