

Introduction

Many years of genetic research have produced the Dekalb White, a docile, feathersexable White Leghorn that delivers large numbers of high eggsize eggs with good quality and performs with excellent feed conversion.

These highly favourable genetic characteristics can only be fully realised when the bird is provided with good 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 Dekalb White 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, climate, 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 Dekalb White. 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 Dekalb White supplier who will be happy to help in any way they can.



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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.

Introduction

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Performance

Performance summary

Rearing period (0-17 wks)

Liveability (%)	96
Body weight at 5 wks (g)	380
Body weight at 17 wks (g)	1205
Feed consumption per bird 0-17 wks (kg)	5.1

Laying period (17-80 wks)

Age at 50% production (days)	141
Peak production (%)	95
Feed consumption as from 140 days of age per hen day (g) until 80 wks	110
Liveability (17-80 wks) (%)	94
Body weight at 80 weeks (g)	1700

	Age in weeks					
	60	64	68	72	76	80
No.eggs HH	251	273	295	315	335	354
Av.egg weight (g)	60.4	60.7	61.0	61.3	61.5	61.8
Egg mass HH (kg)	15.1	16.6	18.0	19.3	20.6	21.9
Feed conversion	1.99	1.99	2.00	2.01	2.02	2.04
Liveability (%)	96.0	95.6	95.2	94.8	94.4	94.0

Body weight and feeding programme

Rearing period

age in weeks	age in days	Type of feed	feedintake per bird		body weight at end of week ¹ (g)
			per day (g)	per cum. (kg)	
1	0-7	starter	9	0.1	60
2	8-14	""	17	0.2	135
3	15-21	""	23	0.3	215
4	22-28	grower	28	0.5	300
5	29-35	""	33	0.8	380
6	36-42	""	36	1.0	460
7	43-49	""	39	1.3	535
8	50-56	""	41	1.6	605
9	57-63	""	43	1.9	670
10	64-70	developer	46	2.2	735
11	71-77	""	49	2.5	795
12	78-84	""	52	2.9	860
13	85-91	""	55	3.3	925
14	92-98	""	58	3.7	995
15	99-105	""	61	4.1	1.065
16	106-112	""	66	4.6	1.135
17	113-119	(pre)layer	73	5.1	1.205

- Bodyweight taken in the afternoon, always weigh the birds at the same time
- The feedintake when reared on floorsystems is approximately 8% higher.

White

White

Average production data laying period

age in weeks	lay (%)	PER HEN DAY				age in weeks	PER HEN HOUSED					
		egg weight (g)	egg mass g/ day	feedintake per day (g)	feed conv. per wk.		cum. no. of eggs	cum. kg eggs	feedintake cum.	feed conv. cum. ²	liveability (%)	bodyweight (g)
18	4.0	44.0	1.8	80	-	18	0	0.0	-	-	100.0	1270
19	14.0	46.0	6.4	87	-	19	1	0.0	-	-	100.0	1320
20 ¹	36.0	47.5	17.1	92	-	20 ¹	4	0.2	-	-	100.0	1380
21	63.0	49.1	30.9	97	3.14	21	8	0.4	0.7	1.78	99.9	1440
22	85.0	51.4	43.7	100	2.29	22	14	0.7	1.4	2.00	99.8	1470
23	92.5	53.0	49.0	102	2.08	23	21	1.0	2.1	2.03	99.7	1485
24	94.3	54.3	51.2	104	2.03	24	27	1.4	2.8	2.03	99.6	1510
25	94.7	55.5	52.6	106	2.02	25	34	1.8	3.6	2.03	99.5	1520
26	95.0	56.5	53.7	108	2.01	26	40	2.1	4.3	2.02	99.4	1530
27	94.8	57.4	54.4	110	2.02	27	47	2.5	5.1	2.02	99.3	1540
28	94.6	58.2	55.1	111	2.02	28	54	2.9	5.8	2.02	99.2	1550
29	94.4	58.9	55.6	112	2.01	29	60	3.3	6.6	2.02	99.1	1560
30	94.2	59.4	56.0	112	2.00	30	67	3.7	7.4	2.02	99.0	1570
31	94.0	59.8	56.2	112	1.99	31	73	4.0	8.2	2.02	98.9	1580
32	93.8	60.2	56.5	112	1.98	32	80	4.4	8.9	2.01	98.8	1590
33	93.6	60.4	56.5	112	1.98	33	86	4.8	9.7	2.01	98.7	1600
34	93.4	60.6	56.6	112	1.98	34	93	5.2	10.5	2.01	98.6	1600
35	93.2	60.8	56.7	112	1.98	35	99	5.6	11.3	2.01	98.5	1610
36	93.0	61.0	56.7	112	1.97	36	105	6.0	12.0	2.00	98.4	1610
37	92.8	61.2	56.8	112	1.97	37	112	6.4	12.8	2.00	98.3	1620
38	92.6	61.4	56.9	112	1.97	38	118	6.8	13.6	2.00	98.2	1620
39	92.4	61.6	56.9	112	1.97	39	124	7.2	14.3	2.00	98.1	1620
40	92.1	61.8	56.9	112	1.97	40	131	7.6	15.1	2.00	98.0	1630
41	91.8	62.0	56.9	111	1.95	41	137	8.0	15.9	2.00	97.9	1630
42	91.5	62.2	56.9	111	1.95	42	143	8.3	16.6	1.99	97.8	1630
43	91.2	62.4	56.9	111	1.95	43	150	8.7	17.4	1.99	97.7	1630
44	90.9	62.5	56.8	111	1.95	44	156	9.1	18.1	1.99	97.6	1640
45	90.6	62.6	56.7	111	1.96	45	162	9.5	18.9	1.99	97.5	1640
46	90.3	62.7	56.6	111	1.96	46	168	9.9	19.7	1.99	97.4	1640
47	90.0	62.8	56.5	111	1.96	47	174	10.3	20.4	1.99	97.3	1640
48	89.6	62.9	56.4	111	1.97	48	180	10.7	21.2	1.99	97.2	1640
49	89.2	63.0	56.2	111	1.98	49	186	11.0	21.9	1.99	97.1	1650
50	88.8	63.1	56.0	111	1.98	50	192	11.4	22.7	1.99	97.0	1650

1 20 weeks= 133-140 days

2 Beyond 20 weeks

White

White

Performance

Performance

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Average production data laying period

age in weeks	lay (%)	PER HEN DAY				age in weeks	PER HEN HOUSED					
		egg weight (g)	egg mass g/ day	feedintake per day (g)	feed conv. per wk.		cum. no. of eggs	cum. kg eggs	feedintake cum.	feed conv. cum. ²	liveability (%)	bodyweight (g)
51	88.4	63.2	55.9	110	1.97	51	198	11.8	23.4	1.98	96.9	1650
52	88.0	63.3	55.7	110	1.97	52	204	12.2	24.2	1.98	96.8	1650
53	87.6	63.4	55.5	110	1.98	53	210	12.6	24.9	1.98	96.7	1650
54	87.2	63.5	55.4	110	1.99	54	216	12.9	25.7	1.98	96.6	1660
55	86.8	63.6	55.2	110	1.99	55	222	13.3	26.4	1.98	96.5	1660
56	86.4	63.7	55.0	110	2.00	56	228	13.7	27.1	1.98	96.4	1660
57	86.0	63.8	54.9	110	2.00	57	234	14.0	27.9	1.99	96.3	1660
58	85.5	63.9	54.6	110	2.01	58	239	14.4	28.6	1.99	96.2	1660
59	85.0	64.0	54.4	110	2.02	59	245	14.8	29.4	1.99	96.1	1670
60	84.5	64.1	54.2	110	2.03	60	251	15.1	30.1	1.99	96.0	1670
61	84.0	64.2	53.9	109	2.02	61	256	15.5	30.8	1.99	95.9	1670
62	83.5	64.3	53.7	109	2.03	62	262	15.9	31.6	1.99	95.8	1670
63	82.9	64.4	53.4	109	2.04	63	268	16.2	32.3	1.99	95.7	1670
64	82.3	64.5	53.1	109	2.05	64	273	16.6	33.0	1.99	95.6	1670
65	81.7	64.6	52.8	109	2.07	65	279	16.9	33.8	1.99	95.5	1670
66	81.1	64.7	52.5	109	2.08	66	284	17.3	34.5	2.00	95.4	1670
67	80.5	64.8	52.2	109	2.09	67	289	17.6	35.2	2.00	95.3	1680
68	79.9	64.9	51.9	109	2.10	68	295	18.0	35.9	2.00	95.2	1680
69	79.2	65.0	51.5	109	2.12	69	300	18.3	36.7	2.00	95.1	1680
70	78.5	65.1	51.1	109	2.13	70	305	18.7	37.4	2.00	95.0	1680
71	77.8	65.2	50.7	109	2.15	71	310	19.0	38.1	2.01	94.9	1680
72	77.1	65.3	50.3	109	2.17	72	315	19.3	38.8	2.01	94.8	1680
73	76.4	65.4	50.0	109	2.18	73	321	19.7	39.6	2.01	94.7	1690
74	75.7	65.5	49.6	109	2.20	74	326	20.0	40.3	2.02	94.6	1690
75	74.9	65.6	49.1	109	2.22	75	331	20.3	41.0	2.02	94.5	1690
76	74.1	65.7	48.7	109	2.24	76	335	20.6	41.7	2.02	94.4	1700
77	73.3	65.8	48.2	109	2.26	77	340	21.0	42.4	2.03	94.3	1700
78	72.5	65.9	47.8	109	2.28	78	345	21.3	43.2	2.03	94.2	1700
79	71.7	66.0	47.3	109	2.30	79	350	21.6	43.9	2.03	94.1	1700
80	70.9	66.1	46.9	109	2.33	80	354	21.9	44.6	2.04	94.0	1700

2 Beyond 20 weeks

White

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Performance

Performance

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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	0	100
46	0	0	1	99
47	0	0	2	98
48	0	0	4	96
49	0	0	9	91
50	0	0	16	84
51	0	0	26	74
52	0	0	38	62
53	0	0	50	50
54	0	0	62	38
55	0	1	71	28
56	0	2	79	19
57	0	4	83	13
58	0	8	84	8
59	0	13	82	5
60	0	21	76	3
61	0	29	69	2
62	0	40	59	1
63	0	50	50	0
64	1	59	40	0
65	2	67	31	0
66	4	73	23	0
67	7	76	17	0
68	11	77	12	0
69	17	75	8	0
70	24	71	5	0

% Eggs per class at given age

Weight class	Weight in grams	Age in weeks					
		30	40	50	60	70	80
XL	> 73	0	0	1	1	2	4
L	63 - 73	16	37	50	60	68	73
M	53 - 63	80	61	49	39	30	23
S	< 53	4	2	0	0	0	0
Avg. egg weight (g)		59.4	61.8	63.1	64.1	65.1	66.1

Cumulative number of eggs per class at the end of lay (on HH basis)

Weight class	Weight in grams	Age in weeks					
		60	72	74	76	78	80
XL	> 73	1	2	2	3	3	3
L	63 - 73	82	123	131	137	144	151
M	53 - 63	144	166	169	171	174	176
S	< 53	24	24	24	24	24	24
Total number		251	315	326	335	345	354

Nutrition

Nutrient recommendations

Nutrient	Starter 0-3 wks	Grower 3-9 wks	Developer 9-17 wks	(Pre) Lay ¹ 17-19 wks
Crude protein (%)	20	18	15.5	16.5
Met. Energy² (kcal/kg)	2975	2875	2750	2775
(MJ/kg)	12.50	12.00	11.50	11.60
Fibre (Crude) (%)	2.0-3.5	2.5-4	4.0-6.0	3.5-6.0
Fat (Crude) max (%)	6.5	7.0	6.0	6.0
Linoleic Acid (%)	1.50	1.25	1.25	1.25
<i>Digestible Amino Acids</i>				
Methionine (%)	0.54	0.45	0.34	0.38
Meth/Cystine (%)	0.92	0.79	0.61	0.68
Lysine (%)	1.20	1.00	0.75	0.80
Tryptropan (%)	0.23	0.19	0.14	0.15
Threonine (%)	0.78	0.65	0.49	0.52
<i>Minerals</i>				
Calcium (%)	1.00	0.95	0.90	2.20
Available P. (%)	0.50	0.48	0.45	0.42
Sodium (%)	0.16	0.15	0.15	0.15
Chloride (%)	0.18-0.22	0.18-0.22	0.18-0.22	0.18-0.22
Premix³ (%)	105%	105%	100%	100%

1 Change to the peaking diet earlier when the production increases faster than the given standard.

2 Depending upon local circumstances, energy levels can be higher or lower. In this event the other levels should be adapted accordingly.

3 100% refers to the table of page 16.

Nutrient	Peaking diet 19-45 wks	Phase 2 45-70 wks	Phase 3 70 - end
Crude protein (%)	17	16.2	15.3
Met. Energy² (kcal/kg)	2800	2775	2750
(MJ/kg)	11.70	11.60	11.50
Fibre (Crude) (%)	max. 5.0	max. 5.5	max. 5.5
Fat (Crude) max (%)	6.5-8.0	max. 8.5	max. 8.5
Linoleic Acid (min.) (%)	2.20	1.60	1.25
<i>Digestible Amino Acids</i>			
Methionine (%)	0.43	0.39	0.36
Meth/Cystine (%)	0.75	0.69	0.63
Lysine (%)	0.85	0.75	0.70
Tryptropan (%)	0.17	0.16	0.15
Threonine (%)	0.56	0.53	0.50
<i>Minerals</i>			
Calcium (%)	3.80	4.00	4.20
Available P. (%)	0.42	0.40	0.38
Sodium (%)	0.15	0.15	0.15
Chloride (%)	0.16-0.20	0.16-0.20	0.16-0.20
Premix³ (%)	100%	100%	95%

1 Change to the peaking diet earlier when the production increases faster than the given standard.

2 Depending upon local circumstances, energy levels can be higher or lower. In this event the other levels should be adapted accordingly.

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White

White

Premix recommendations

The levels shown below are based on normal feed intake levels. With substantially lower feed intake adapt these levels accordingly. Essential for the premix is the stability and the correct mixing in the feed. If those factors are unknown, it is advisable to build in a safety.

Add per ton feed ¹		Growing period	Laying period
Selenium (Se) ²	mg	250	250
Iron (Fe)	mg	70,000	70,000
Manganese (Mn)	mg	70,000	80,000
Copper (Cu)	mg	10,000	15,000
Zinc (Zn)	mg	70,000	80,000
Iodine (I)	mg	1,000	1,000
Cobalt (Co)	mg	250	250
Vitamin A (Retinol)	I.U.	9,500,000	8,000,000
Vitamin D3 (Cholecalciferol)	I.U.	2,500,000	2,500,000
Vitamin E (Tocopherol)	I.U.	20,000	10,000
Vitamin K3 (Menadione)	mg	3,000	2,000
Vitamin B1 (Thiamin)	mg	2,000	1,000
Vitamin B2 (Riboflavin)	mg	5,000	5,000
Vitamin B6 (Pyridoxine)	mg	3,000	2,000
Vitamin B12 (Cobalamin)	mg	20	20
Vitamin H (Biotin)	mg	100	70
Choline (added)	mg	300,000	300,000
Nicotinic Acid	mg	30,000	30,000
Pantothenic Acid	mg	10,000	7,500
Folic Acid	mg	1,000	500
Adding of antioxidants		required	required

1 In hot periods it is recommended to add also 100 PPM vitamin C.

2 Se is not permitted in some countries.

Requirements of amino acids and energy

Feed intake is determined by the bird's need for energy and the energy content of its feed. If a higher temperature or a higher than normal feed energy content results in a lower feed intake, care should be taken to compensate for this by providing higher concentrations of essential elements such as amino acids, vitamins and minerals. Adequate levels of methionine and cystine are important factors for ensuring adequate egg size during the first few months of lay.

Amino acid requirements at different production levels (total amino acids in mg per bird per day).

Amino Acid	Production level		
	Over 90% prod. > 55 g egg mass	80-90% prod. 50-55 g. egg mass	below 80% prod. < 55 g egg mass
Methionine	430	390	360
Met.+ Cyst.	750	690	630
Lysine	850	750	700
Tryptophan	170	160	150
Threonine	560	530	500

Energy requirements at different temperatures and production levels (ME requirements in kcal (kJ) per bird per day)

Temp. (°C)	Production level		
	Over 90% prod. > 55 g egg mass	80-90% prod. 53-54 g. egg mass	below 80% prod. < 51 g egg mass
18	325 (1365)	320 (1344)	315 (1323)
22	315 (1323)	310 (1302)	305 (1281)
26	305 (1281)	295 (1239)	290 (1218)
30	290 (1218)	280 (1176)	275 (1155)
33	280 (1176)	275 (1155)	270 (1134)

At very high temperatures (above 33°C) the birds may not be able to eat enough. A well balanced feed with high energy content (preferably with fat) an adequate level of amino acids but not a too high level of protein and cool drinking water may help to reduce this problem.

Required amino acid and met. energy content of the feed at different production and feed intake levels.

Hen day prod.	Feed intake per bird/day (g)	Nutrient					
		meth. (%)	meth. + cyst.(%)	lysine (%)	tryptoph. (%)	threonine (%)	M.E. ¹ (kcal)
Over 90 % (> 55 g egg mass)	95	0.50	0.87	0.98	0.20	0.65	3242
	100	0.47	0.83	0.94	0.19	0.62	3080
	105	0.45	0.79	0.89	0.18	0.59	2930
	110	0.43	0.75	0.85	0.17	0.56	2800
	115	0.41	0.72	0.81	0.16	0.54	2680
80-90 % (50 - 55 g egg mass)	95	0.43	0.76	0.83	0.18	0.59	3070
	100	0.41	0.72	0.79	0.17	0.56	2910
	105	0.39	0.69	0.75	0.16	0.53	2775
	110	0.37	0.66	0.72	0.15	0.51	2650
Below 80% (< 50 g egg mass)	95	0.40	0.70	0.77	0.17	0.55	3040
	100	0.38	0.66	0.73	0.16	0.52	2880
	105	0.36	0.63	0.70	0.15	0.50	2750
	110	0.35	0.60	0.67	0.14	0.48	2625

1 Met. Energy in kcal/kg and a house temp. of 22°C

Daily Calcium requirement in the laying period

Calcium consumption per day

Daily feed intake (g)	Calcium in the diet					
	3.2%	3.4%	3.6%	3.8%	4.0%	4.2%
90	2.88	3.06	3.24	3.42	3.60	3.78
95	3.04	3.23	3.42	3.61	3.80	4.00
100	3.20	3.40	3.60	3.80	4.00	4.20
105	3.36	3.57	3.78	3.99	4.20	4.41
110	3.52	3.74	3.96	4.18	4.40	4.62
115	3.68	3.91	4.14	4.37	4.60	4.83
120	3.84	4.08	4.32	4.56	4.80	5.04

If possible 50% of the added Ca in the feed should be in coarse particles (limestone particles, oyster shells) to provide sufficient Ca for eggshell formation, which occurs during the night.

Calcium requirements per bird per day in grams

Production	Age in weeks			
	17-20	20-45	45-70	>70
< 50%	2.1	-	-	-
50-70%	2.8	3.0	3.9	4.1
75%	3.0	3.2	4.0	4.2
80%	3.2	3.3	4.1	4.4
85%	3.3	3.5	4.2	4.6
> 90%	-	3.6	4.3	-

By subtracting the daily calcium intake from the daily calcium requirement you obtain the amount of supplementary calcium to be provided. Since the calcium content of oyster shell and calcium carbonate is close to 40%, the number of grams of calcium that should be added should be multiplied by 2.5 to calculate the amount of oyster shell or calcium carbonate in grams per bird per day. The best way to feed the oyster shell is to distribute it over the feed during the last turn of the feed chain before dark.

Management

Rearing and laying period

Rearing period

Brooding temperature:

Age	Chick level temperature
first 5 hours	36°C
5 hrs-7 days	34°C → 31°C
2nd week	31°C → 28°C
3rd week	28°C → 26°C
4th week	26°C → 24°C
5th week	24°C → 22°C
6th week	22°C → 20°C

- 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.

Debeaking

Debeaking is recommended between 6-8 weeks. If circumstances dictate, debeaking can be carried out earlier.

Optimum rel. humidity:

Advisable is a relative humidity of 60 - 70 %

Optimum light intensity:

Age	Lux	Watts/m ²
0 - 7 days	min. 20	min. 4
7 days - 4 weeks	10	3
4 - 17 weeks	6	2
beyond 17 weeks	10	3.2

Lighting programme

Windowless houses

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 in the appendix to the hatch season. Flocks hatched in the 'off season', with reduced day length should follow the early maturity stimulating programme A. Flocks reared in the increasing day length season should follow a programme closer to the B programme to delay the production start.

- The Rearing Chart in the appendix presents the recommended lighting programme for windowless houses.
- Lighting programme A (see appendix) is advised for standard conditions.
If desired, lighting programme B may be used to stimulate body weight development and to delay start of production.
- Light stimulation should commence when bodyweight is on target.
- If at four weeks of age the flock is behind in bodyweight, the step down programme as described in the rearing chart (programme A) can be slowed. To do this, simply do not reduce the day length as the schedule recommends for one or two weeks. After that time, resume the programme as designed. This will allow the flock extra feeding time and will encourage weight gains.

Windowed houses

This schedule has to be made in line with the natural day length by time zone, as shown in the 'Duration of day length in the appendix. The minimum daylength in open houses may not exceed the maximum natural day length between 8 and 18 weeks of age.

Feeding

- Deviation from body weights and feed amounts given on page 7 may occur due to season, housing system, feed composition, debeaking, 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.

Bodyweight development

- Try to achieve a 5 weeks bodyweight as high as possible. When the bodyweight is on or above the standard then try to obtain the same growth per week as in the given standard up to 14 weeks of age. From 14 weeks onwards try to achieve a bodyweight as high as possible. When bodyweight on 5 weeks of age is lower than our standard it is important to achieve standard bodyweight as quickly as possible.
- After 16 weeks bodyweight development is critical for a good production start: avoid unnecessary stress during this time; house the birds before 17 weeks and start giving (pre)layer feed 1 week before the production starts.
- The change to the peaking diet is depending on the production level and not on age.

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.

Pre-lay key results

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

Body weight (g)	Approximate age (wks)		Day length (hrs)	Feed amount (g/bird/day)
1135	16	start light stimulation	10	66
1205	17	start (pre)-layer feed	11	73
1270	18	first egg	12	80
1320	19	start layer feed	13	87
1380	20	±35% production	14	92
1440	21	50% production	14-16	97
1530	26	peak production	14-16	108

- If the projected production start is to be delayed in comparison to the above standard, increases in both day length and feed amount should also be correspondingly delayed accordingly to obtain the desired body weight, at the start of production.
- We advise to increase the day length until 16 hrs per day.

Laying period

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. The ideal house temperature is between 21-24°C at the beginning of production and 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. It is necessary to maintain good air quality at all times.
- It is good practice to empty the feeders during the middle part of the day. This without restricting the flock. Practise this from 5-6 wks of age onwards in the rearing period.

Housing and Equipment

Cage system

	Rearing period			Laying period	
	0- 3 wks	3- 10 wks	10- 17 wks	Normal cage 17-80 wks	Enriched cage 17-80 wks
<i>Stocking density</i>					
Birds/m²	85	50	30	22	13
cm² /bird	120	200	330	400-550	750
Accessible area¹					600
<i>Water supply</i>					
Birds/nipple	10 ²	10	10	5	5
Nipples/cage	2	2	2	1 ³	2
Trough cm/ bird	1	2	2	2	2
<i>Feed supply</i>					
Trough cm/ bird	2 ⁴	4	6	8-10	12
Perches cm per bird					15
Laying nest cm² per bird					83

- 1 Accessible area is the whole area except the laying nest and other spots which are lower in height than 45 cm.
- 2 Place one additional drinker per cage for the first week.
- 3 Make sure the birds have access to 2 nipples.
- 4 Spread sheets of paper over the cage bottom to last for 7 days; remove one sheet each day.

Housing and Equipment

Floor system

	Rearing period			Laying
	0-5 wks	5- 10 wks	10-17 wks	17-80 wks
<i>Stocking density</i>				
Forced vent. birds/m²	20	15	10	8
Natural vent. birds/m²	15	12	9	7
<i>Water supply¹</i>				
Through cm/bird	1	2	2.5	2.5
Round drinkers mod. climate				
birds/drinker	75	100	100	100
hot climate				
birds/drinker	75	75	75	75
Nipples				
birds/nipple	10	9	8	8
<i>Feed supply²</i>				
Trough feeders cm/bird	5	7	9	10
Round feeders³ birds/feeder	35	25	23	20
<i>Laying nests</i>				
Indiv. nests birds/nest	-	-	-	6
commun. nests m² /100 birds				1.2

- 1 For the first 2 weeks 1 chick drinker per 75 birds.
- 2 For the first week place 1 feeder plate per 50 chickens.
- 3 Round feeders with a circumference of 100 cm.

White

Appendix

White

Duration of daylight¹

Latitudes (N) Week No.	Date N.H. ²	65-60°	60-55°	55-50°	50-45°	45-40°	40-35°	35-30°	30-25°	Date S.H. ²
D U R A T I O N O F D A Y L E N G T H I N H O U R S										
1	4 Jan	5.00	6.40	8.00	8.30	9.10	9.40	10.10	10.30	4 July
2	11 Jan	5.40	6.50	8.10	8.40	9.20	9.40	10.10	10.30	11 July
3	18 Jan	6.00	7.20	8.20	8.50	9.30	10.00	10.20	10.40	18 July
4	25 Jan	6.40	7.50	8.40	9.10	9.40	10.10	10.30	10.40	25 July
5	1 Feb	7.20	8.20	9.00	9.30	10.00	10.20	10.40	11.00	1 Aug
6	8 Feb	8.10	9.00	9.30	10.00	10.10	10.30	10.50	11.00	8 Aug
7	15 Feb	9.00	9.20	10.00	10.20	10.30	10.40	11.00	11.10	15 Aug
8	22 Feb	9.30	9.50	10.20	10.40	10.50	11.00	11.10	11.20	22 Aug
9	1 Mar	10.10	10.40	10.50	11.00	11.10	11.20	11.30	11.30	1 Sept
10	8 Mar	11.00	11.20	11.20	11.30	11.30	11.40	11.40	11.40	8 Sept
11	15 Mar	11.40	12.00	11.50	11.50	11.50	12.00	11.50	11.50	15 Sept
12	22 Mar	12.20	12.20	12.20	12.10	12.10	12.10	12.10	12.10	22 Sept
13	29 Mar	13.00	13.00	12.40	12.40	12.30	12.30	12.20	12.20	29 Sept
14	5 Apr	13.50	13.50	13.10	13.00	12.50	12.50	12.40	12.30	5 Oct
15	12 Apr	14.40	14.10	13.40	13.20	13.20	13.00	13.00	12.40	12 Oct
16	19 Apr	15.20	14.50	14.20	13.40	13.30	13.20	13.10	12.50	19 Oct
17	26 Apr	16.00	15.10	14.30	14.00	13.50	13.50	13.20	13.00	26 Oct
18	3 May	16.50	15.40	15.00	14.30	14.20	13.50	13.30	13.10	3 Nov
19	10 May	17.50	16.20	15.20	14.50	14.20	14.00	13.40	13.20	10 Nov
20	17 May	18.10	16.30	15.50	15.10	14.40	14.20	13.50	13.30	17 Nov
21	24 May	18.50	17.20	16.10	15.30	15.00	14.30	14.00	13.40	24 Nov
22	31 May	19.20	17.40	16.20	15.30	15.10	14.40	14.10	13.40	31 Nov
23	7 June	19.50	18.00	16.30	15.40	15.10	14.40	14.10	13.40	7 Dec
24	14 June	20.10	18.10	16.40	15.40	15.20	14.40	14.10	13.50	14 Dec
25	21 June	20.20	18.10	16.40	15.50	15.20	14.40	14.10	13.50	21 Dec
26	28 June	20.10	18.10	16.40	16.00	15.20	14.40	14.20	13.50	28 Dec

1 This table gives the time intervals between sunrise and sunset for the different latitudes.

2 N.H. = dates for the northern hemisphere.

2 S.H. = dates for the southern hemisphere.

Details available at local meteorological station.

Duration of daylight¹

Latitudes (N) Week No.	Date N.H. ²	65-60°	60-55°	55-50°	50-45°	45-40°	40-35°	35-30°	30-25°	Date S.H. ²
D U R A T I O N O F D A Y L E N G T H I N H O U R S										
27	9 July	19.50	18.00	16.30	15.50	15.10	14.40	14.20	13.50	9 Jan
28	12 July	19.20	17.40	16.20	15.50	15.10	14.40	14.20	13.50	12 Jan
29	19 July	18.40	16.20	16.10	15.30	15.10	14.30	14.20	13.40	19 Jan
30	26 July	18.10	16.50	15.50	15.20	14.40	14.20	14.00	13.30	26 Jan
31	2 Aug	17.30	16.20	15.30	14.50	14.30	14.10	13.50	13.30	2 Feb
32	9 Aug	16.50	15.50	15.00	14.50	14.10	13.50	13.30	13.20	9 Feb
33	16 Aug	16.30	15.10	14.30	14.10	13.50	13.40	13.20	13.10	16 Feb
34	23 Aug	15.20	14.50	14.00	13.50	13.30	13.20	13.10	13.00	23 Feb
35	30 Aug	14.50	14.40	13.40	13.30	13.20	13.10	13.00	12.50	2 Mar
36	6 Sept	14.30	13.40	13.20	13.10	13.00	12.30	12.40	12.40	6 Mar
37	13 Sept	13.10	13.00	12.50	12.40	12.40	12.30	12.30	12.30	13 Mar
38	20 Sept	12.20	12.20	12.30	12.10	12.10	12.10	12.10	12.20	20 Mar
39	27 Sept	11.50	11.30	12.00	11.50	11.50	12.00	12.00	12.10	27 Mar
40	4 Oct	11.00	11.10	11.20	11.30	11.30	11.40	11.50	11.50	4 Apr
41	11 Oct	10.20	10.40	10.50	11.00	11.20	11.20	11.30	11.40	11 Apr
42	18 Oct	9.50	10.10	10.30	10.40	11.00	11.10	11.20	11.30	18 Apr
43	25 Oct	9.00	9.30	10.00	10.20	10.40	11.00	11.10	11.20	25 Apr
44	1 Nov	9.10	9.00	9.40	10.00	10.20	10.40	11.00	11.10	1 May
45	8 Nov	7.30	8.20	9.10	9.40	10.00	10.20	10.40	11.00	8 May
46	15 Nov	6.30	7.50	8.50	9.20	9.40	10.10	10.30	10.50	15 May
47	22 Nov	6.10	7.30	8.30	9.00	9.30	10.00	10.20	10.40	22 May
48	29 Nov	5.40	7.00	8.10	8.40	9.20	9.50	10.10	10.30	29 May
49	6 Dec	5.10	6.50	8.00	8.30	9.10	9.40	10.10	10.20	6 June
50	13 Dec	4.50	6.30	7.50	8.20	9.00	9.40	10.00	10.20	13 June
51	20 Dec	4.40	6.30	7.40	8.20	9.00	9.40	10.00	10.20	20 June
52	27 Dec	4.40	6.30	7.50	8.20	9.00	9.40	10.00	10.20	27 June

¹ This table gives the time intervals between sunrise and sunset for the different latitudes.

² N.H. = dates for the northern hemisphere.

² S.H. = dates for the southern hemisphere.

Details available at local meteorological station.

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.

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

1 cubic meter/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

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



