Table 4   Summary of research on the effect of light program on leg health in broiler chickens (page 1 of 3)

Study	Population Age Sex Breed	Group size (N)/ replications per treatment	Continuous light schedule (Comparator)	Dark/light schedule (Exposure)	Outcome and the effect of exposure indicated as $(\downarrow)^1,(\uparrow)^2$ or $(0)^3$.
Robbins *et al* 1984	1 day to 8 weeks Mixed Hubbard x White mountain	15/5	24L	16L:8D	Incidence of leg disorders ($\downarrow$)
Wilson *et al* 1984	1 day to 49 days Males Not stated	3 experiments each using a total of 2400/not stated	Continuous lighting	1L:2D	Incidence of leg abnormalities ($\downarrow$) Gait score ($\downarrow$)
Ketelaars *et al* 1986	1 day to 6 weeks Mixed Not stated	Total of 960/2	23L:1D	1L:3D	Incidence of leg abnormalities ($\downarrow$)
Classen & Riddell 1989	1 day to 42 days Mixed Not stated	Experiment 1: 300/2 Experiment 2: 600/2 Experiment 3: Total of 5616/3	23L:1D	1) 6L:18D (Day 1-14), 23L: 1D (Day 21-42) 2) Gradual increase 6L → 23L	Incidence of leg abnormalities ($\downarrow$)
Classen *et al* 1991	1 day to 42 days Mixed Not stated	Total of 5616/3	23L:1D	1) Gradual increase 6L → 23L 2) Gradual increase 6L → 23L with 1L midway through the scotoperiod	Incidence of leg abnormalities ($\downarrow$)
Renden *et al* 1991	1 day to 56 days Males Ross x Cobb	100/4	23L:1D	1) 1L:3D 2) 6L:18D (Day 1-14) 1L:3D (Day 15-56) 3) 6L:18D (Day 1-14); 23L:1D (Day 15-56)	TD score (0) Prevalence of leg problems ($\downarrow$)[4]
Renden *et al* 1992	1 day - 42 days Males Peterson x Arbor Acres and Ross x Arbor Acres	50/4	23L:1D	6L:18D (Day 1-14), 1L:3D (Day 15-56)	Culled due to leg problems ($\downarrow$) Prevalence of leg disorders ($\downarrow$) TD score ($\downarrow$)
Blair *et al* 1993	1 day to 42 days Males Peterson x Arbor Acres	150/4	23L:1D	Gradual increase 6L → 23L	Incidence of valgus twisting (0) Incidence of varus twisting ($\downarrow$) Ability to jump ($\uparrow$)
Wong-Valle *et al* 1993	Experiment 1: 1 day to 7 weeks Mixed Not stated Experiment 2: 1 day to 7 weeks Males Not stated	Experiment 1: 126/4 Experiment 2: 150/4	23L:1D	1L:3D	Incidence of TD (0)

Abbreviations: L=hours of light, D=hours of darkness
1. ($\downarrow$) A dark/light schedule resulted in a significant decrease in the outcome. For all outcomes, except ability to jump on platform, a decrease in the outcome signifies a positive effect of a dark/light schedule on leg health.
2. ($\uparrow$) A dark/light schedule resulted in an increase in the outcome.
3. (0) A dark/light schedule had no significant effect on the outcome.
4. The 23L:1D light program increases prevalence of leg problems only when comparing to light program 2. When comparing 23L:1D to light program 1 and 3 there is no difference in prevalence of leg problems.
5. The 23L:1D light program increases gait scores only when comparing to light program 2. When comparing 23L:1D to light program 1 there is no difference.

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Table 4   Summary of research on the effect of light program on leg health in broiler chickens (page 2 of 3)

Study	Population Age Sex Breed	Group size (N)/ replications per treatment	Continuous light schedule (Comparator)	Dark/light schedule (Exposure)	Outcome and the effect of exposure indicated as $(\downarrow)^1,(\uparrow)^2$ or $(0)^3$.
Leterrier and Constantin 1996	1 day to 42 days Males IJV915	205/not stated	23L:1D	Photoperiod gradually decrease (day 1-8), gradually increase (day 9- 42)	Prevalence of valgus-varus deformities ($\downarrow$) Occurrence of crooked toes ($\downarrow$)
Renden et al 1996	Experiment 1: 1 day to 49 days Males Ross 208 Experiment 2: 1 day to 42 days Males Ross 208	50/4	23l:1D	Experiment 1: 1) 16L:8D 2) 16L:3D:1L:4D 3) 16L:2D:1L:2D:1L:2D Experiment 2: 1) 16L:2D:1L:2D:1L:2D 2) Gradual increase in light, simple 3) Gradual increase in light, complex	Experiment 1: Prevalence of leg problems ($\downarrow$) Prevalence of TD (0) Experiment 2: Prevalence of leg problems (0) Prevalence of TD (0)
Sorensen et al 1999	1 day to 44 days Mixed Ross 208	Experiment 1: not relevant Experiment 2: 500/4 Experiment 3: 350/6 Experiment 4: 30/48	Experiment 2: 23L:1D Experiment 3 & 4: 21L:1 D	16L:8D	Experiment 2: Gait score ($\downarrow$) Experiment 3: Gait score (0) Footpad burn score ($\uparrow$) Hock burn score (0) Experiment 4: Gait score (0) Experiment 2,3 & 4: TD score ($\downarrow$) Valgus/varus angulation score (0)
Rozenboim et al 1999	1 day to 49 days Mixed Avian	90/3	23L:1D	1) Increasing day length 2) Intermitted light with increase in total light per day	Percentage of leg condemnation ($\uparrow$)
Sanotra et al 2002	1 day to 35 days Mixed Ross 208	2 commercial producers: 55000 and35000 per house/2 replicates per producer	24L	1) Gradual decrease and increase light schedule 2) Instant decrease and increase light schedule	Gait score ($\downarrow$)[5] TD score ($\downarrow$)
Siddiqui et al 2003	1 day to 49 days Mixed Vencobb	50/4	23L:1D	2L:4D	Incidence of leg abnormalities ($\downarrow$) Severity of leg abnormalities measured as walking ability (0) Mortality due to leg disorders (0)
Petek et al 2005	1 day to 6 weeks Males Ross PM3	50/4	24L	12L + (3x(1L:3D))	TD score (0) Diameter of knee joint (0) Length and thickness of tibiotarsus (0)
Onbasilar et al 2007	1 day to 6 weeks Males Ross PM3	20/5	24L	1L:3D	TD score (0)
Brickett et al 2007	1 day to 35 days Males Ross 308	50/not stated	20L:4D	12L:12D	Gait score ($\downarrow$) Bone ash of tibiotarsus ($\downarrow$) Length, width and curvature of femur and tibiotarsus (0) Histology of femoral head (0)

Abbreviations: L=hours of light, D=hours of darkness

1. ($\downarrow$) A dark/light schedule resulted in a significant decrease in the outcome. For all outcomes, except ability to jump on platform, a decrease in the outcome signifies a positive effect of a dark/light schedule on leg health.

2. ($\uparrow$) A dark/light schedule resulted in an increase in the outcome.

3. (0) A dark/light schedule had no significant effect on the outcome.

4. The 23L:1D light program increases prevalence of leg problems only when comparing to light program 2. When comparing 23L:1D to light program 1 and 3 there is no difference in prevalence of leg problems.

5. The 23L:1D light program increases gait scores only when comparing to light program 2. When comparing 23L:1D to light program 1 there is no difference.

Table 4   Summary of research on the effect of light program on leg health in broiler chickens (page 3 of 3)

Study	Population Age Sex Breed	Group size (N)/ replications per treatment	Continuous light schedule (Comparator)	Dark/light schedule (Exposure)	Outcome and the effect of exposure indicated as $(\downarrow)^1$, $(\uparrow)^2$ or $(0)^3$.
Yildiz *et al* 2009	1 day - 6 weeks Mixed Ross PM3	25/4	24L	12L + (3x(1L:3D))	Weight and length of tibiotarsus ($\downarrow$) TD score (0) Cortical thickness and volume ($\downarrow$)
Blatchford *et al* 2012	1 day - 42 days Mixed Cobb 500	40 to 42/4	23L:1D	1) 20L:4D 2) 16L:8D	Gait score (0)
Schwean-Lardner *et al* 2013	4 experiments: 1 day to 31-48 days Mixed Ross x Ross 308 and Ross x 708	Total ranging from 2912 to 5040/2	23L:1D	1) 20L:4D 2) 17L:7D 3) 14L: 10D	Gait score ($\downarrow$) Footpad dermatitis score ($\downarrow$)
Das & Lacin 2014	1 day to 42 days Males Ross 308	Not stated (total of 480)/10	24L	1) 16L:8D 2) 4L:2D	Gait scores ($\downarrow$) TD score (0)
Van der Pol *et al* 2015	Experiment 1: 1 day to 4 days Mixed Ross 308 Experiment 2: 1 day to 4 days Males Ross 308	50/20	24 L	1) 2L:1D (abrupt) 2) 2L:1D (dimming) 3) 2L:6D (abrupt) 4) 2L:6D (dimming)	Experiment 1: Tibia and femur diameter ($\downarrow$) Other tibia and femur properties (0) Experiment 2: Femur diameter ($\downarrow$) Other tibia and femur properties (0)

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1. ($\downarrow$) A dark/light schedule resulted in a significant decrease in the outcome. For all outcomes, except ability to jump on platform, a decrease in the outcome signifies a positive effect of a dark/light schedule on leg health.
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