

Effects of genotype and husbandry system on pododermatitis and plumage soiling in organic turkey production

D. Haug¹, R. Schreiter², B. Thesing¹, L. Rathmann³, **C. Lambertz⁴**, P. Hofmann⁵, M. Erhard⁵, G. Bellof¹, E. Schmidt¹

¹ Weihenstephan-Triesdorf University of Applied Sciences, Am Staudengarten 1, 85354 Freising, Germany

² HenControl, Poultry Consulting, 09390 Gornsdorf, Germany

³ Bavarian State Estates, Mainbernheimer Str. 101, 97318 Kitzingen, Germany

⁴ Research Institute of Organic Agriculture (FiBL), Walburger Str. 2, 37213 Witzenhausen, Germany

⁵ Bavarian State Research Center for Agriculture, Mainbernheimer Str. 101, 97318 Kitzingen, Germany

⁶ Ludwig-Maximilians-Universität München, Veterinärstr. 13R, 80539 München, Germany

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Background

- Foodpad dermatitis and plumage soiling major welfare problems in turkey farming
 - Genetic disposition
 - Husbandry
 - Management
 - Age
 - Litter moisture
 - Feeding

Krautwald-Junghanns et al., 2017



Aim of the study

Investigate the effect of two different genotypes (slow- and fast-growing) fed 100% organic in three different husbandry systems on foodpad dermatitis and plumage soiling



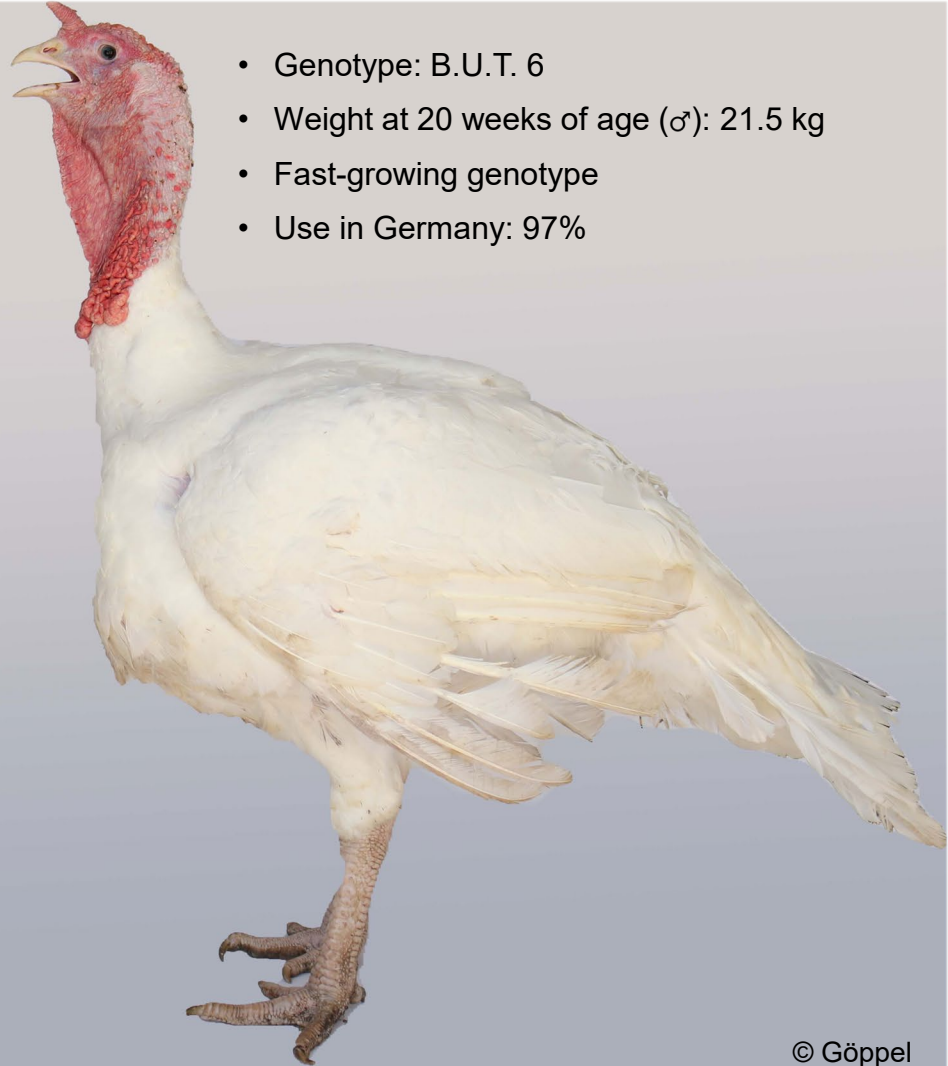
Animals, Material and Methods

- Two locations with 24 pens (12/20 animals/pen)
- Non-beaktrimmed males of two genotypes

- Genotype: Auburn
- Weight at 20 weeks of age (σ): 15.0 kg
- Slow-growing genotype



- Genotype: B.U.T. 6
- Weight at 20 weeks of age (σ): 21.5 kg
- Fast-growing genotype
- Use in Germany: 97%





Animals, Material and Methods

- Two locations with 24 pens (12/20 animals/pen)
- Non-beaktrimmed males of two genotypes
- 4 feeding groups with 6 replicates

Feeding



Ingredient	Phase 1 (week 1-4)	Phase 2 (week 5-8)	Phase 3 (week 9-12)	Phase 4 (week 13-16)	Phase 5 (week 17-20)
Soy bean cake	120	120	120	120	100
Sun flower cake (45% XP)	230	115	-	-	-
Sun flower cake (38% XP)	-	115	210	80	-
Sun flower cake (30% XP)	-	-	-	50	125
Pea protein concentrate	70	50	-	-	-
Peas	-	-	150	50	50
Rapeseed kernel cake	70	90	-	-	-
Rapeseed cake	-	-	80	70	50
Corn	126	149	165	219	217
Wheat	125	170	130	200	200
Triticale	-	-	70	150	200
Oat	100	120	-	-	-
EcoVit R (Vitamin B2)	0.2/0.8	0.25/0.75	0.15/0.5	0.1/0.4	0.1/0.4
Nutrient content					
Crude protein	280	278		245	246
Lysine	14.2	14.3		12.0	12.5
Methionine	5.0	4.8		4.3	4.5
AME _N (MJ) ¹	11.6	11.5		11.5	11.5



Animals, Material and Methods

- Two locations á 24 pens (12/20 animals/pen)
- Non-beaktrimmed males of two genotypes
- 4 feeding groups with 6 replicates
- Indoor housing until 8 weeks of age

Husbandry systems during fattening (weeks 13-20)



H1-

- Location 1
- Indoor housing
- Compound feed



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Husbandry systems during fattening

H1-

- Location 1
- Indoor housing
- Compound feed

H2+

- Location 2
- Indoor housing
- Compound feed PLUS silage feeding during fattening (weeks 13-20)
- Environmental enrichment (elevated platforms)



Husbandry systems during fattening (weeks 13-20)



H3-MS

- Location 2
- Indoor housing until week 8 and mobile housing system with free-range Compound feed PLUS free-range (weeks 13-20)
- Environmental enrichment (elevated platforms)

Data collection



Scoring of food pad dermatitis and plumage soiling four-weekly

Criteria/Score		Definition
Pododermatitis		
0	intact footpad	intact, soft footpad no swelling and necrosis
1	low grade pododermatitis	superficial signs of wear, corneal papillae are separated and/or slight swelling of the footpad and/or small, punctiform necroses on the ball of the foot/toe
2	mild pododermatitis	swelling of the pad of the foot/toe, and necrosis of the pad of the foot $\leq 25\%$ and/or necrosis of the pad of the toe $> punctate$ (1 affected phalanx)
3	moderate pododermatitis	marked swelling of the pad of the foot/toe and necrosis of the pad of the foot necrosis of the pad of the foot $> 25\%$ and $\leq 50\%$ and/or necrosis on the pad of the toe $> punctate$ (2 affected phalanges)
4	high-grade pododermatitis	very severe swelling of the pad of the foot and/or necrosis on the pad of the foot $> 50\%$ necrosis of the pad of the toe $> punctate$ (≥ 3 affected phalanges)
Plumage soiling		
0	clean plumage	no soiling
1	slight soiling	discolouration of the plumage ≤ 8 cm
2	medium degree of soiling	coherent plumage discolourations > 8 cm and/or clear, coherent faecal litter adhesions ≤ 8 cm
3	high degree of soiling	clear, coherent faecal litter adhesions > 8 cm

Effects of genotype, husbandry system and dietary treatment on footpad dermatitis



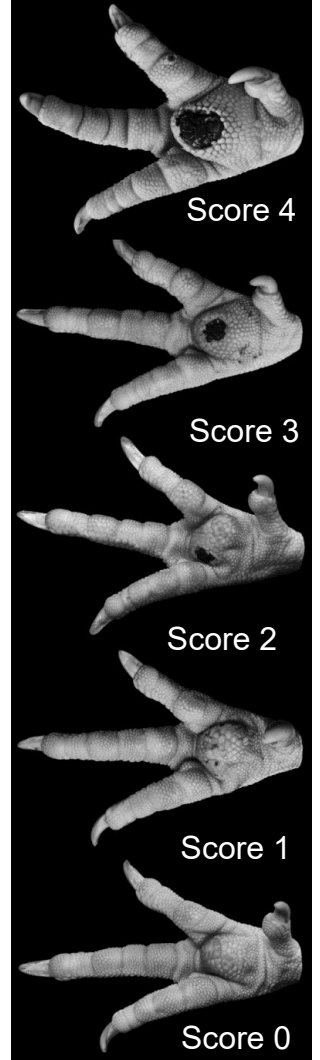
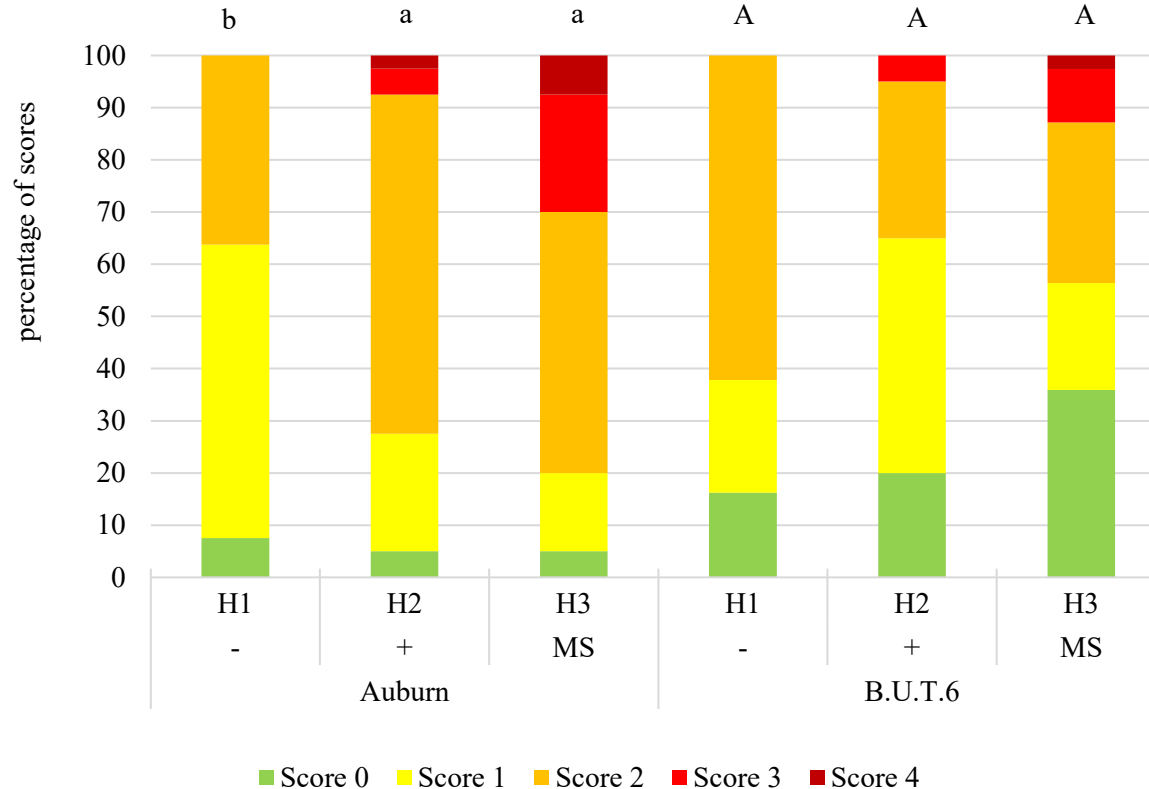
Age	Genotype (G)		Husbandry system (H) ²			Dietary treatment (V) ³		p-values		
	Auburn	B.U.T. 6	H1 -	HS +	H3 MS	V1	V2	G	H	D
4 th week	0,10	0,10	0,00	0,21		0,11	0,09	0,985	<0,001 ⁴	0,667
8 th week	0,42	0,28	0,00	0,76		0,36	0,37	0,049	<0,001	0,886
12 th week	0,63	0,39	0,00 ^c	1,44 ^a	0,71 ^b	0,56	0,50	0,008	<0,001	0,533
16 th week	1,44	0,89	0,89 ^b	1,59 ^a	1,51 ^a	1,25	1,23	<0,001	<0,001	0,941
20 th week	1,59	1,35	1,38 ^b	1,60 ^{ab}	1,72 ^a	1,49	1,54	0,020	0,020	0,630

¹Mann-Whitney-U test for rearing (up to 8 weeks of age) and Kruskal Wallis test for fattening (9-20 weeks of age)

²H1- = indoor housing without environmental enrichment; H2+ = indoor housing with environmental enrichment and silage supplementary feeding from the 9th week; H3 (MS) from 9 weeks of age = mobile housing with environmental enrichment and green runout

³Dietary treatments differed in riboflavin content

Footpad dermatitis at end of fattening



Effects of genotype, husbandry system and dietary treatment on plumage soiling (back, breast/wing, butt)



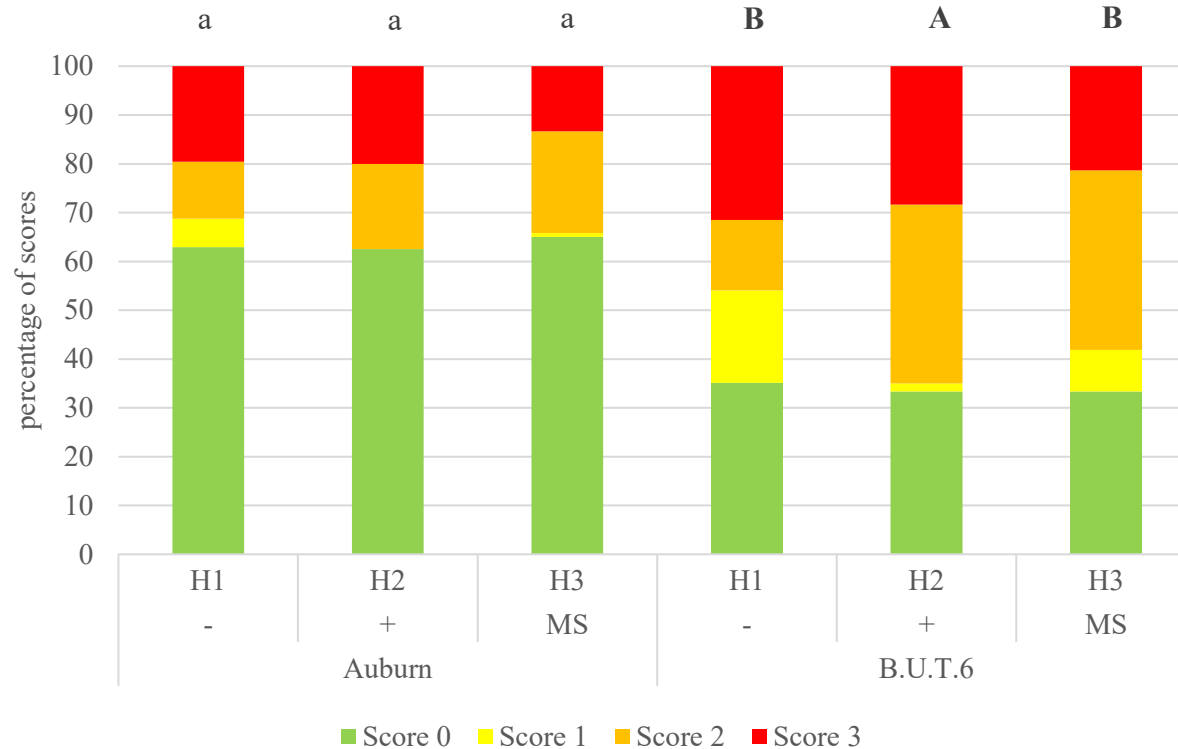
Indicator/ age	Genotype(G)		Husbandry system (H) ²			Dietary treatment (V) ³		p-values		
	Auburn	B.U.T. 6	H1 FS-	HS FS+	H3 MS	V1	V2	G	H	V
4 th week	0,03	0,25	0,03	0,17		0,15	0,05	<0,001	<0,001	0,019
8 th week	0,58	2,16	0,14	2,24		0,96	0,66	<0,001	<0,001	0,065
12 th week	1,92	4,11	1,62 ^b	3,45 ^a	3,47 ^a	2,78	2,58	<0,001	<0,001	0,707
16 th week	2,31	4,39	2,02 ^b	3,54 ^a	3,59 ^a	3,14	2,85	<0,001	<0,001	0,140
20 th week	2,60	4,46	3,14	3,39	3,38	3,42	3,11	<0,001	0,199	0,137

¹Mann-Whitney-U test for rearing (up to 8 weeks of age) and Kruskal Wallis test for fattening (9-20 weeks of age)

²H1- = indoor housing without environmental enrichment; H2+ = indoor housing with environmental enrichment and silage supplementary feeding from the 9th week; H3 (MS) from 9 weeks of age = mobile housing with environmental enrichment and green runout

³Dietary treatments differed in riboflavin content

Plumage soiling at the end of fattening



H1- = indoor housing without environmental enrichment; H2+ = indoor housing with environmental enrichment and silage supplementary feeding from the 12th week; H3 (MS) from 12 weeks of age = mobile housing with environmental enrichment and green runoff; score ranged from 0 (=no damage) to 3 (=severe damage) (supplemental table 1)

Conclusions



1. More and more severe footpad lesions in Auburn compared to B.U.T. 6.
2. Most and most severe footpad lesions were found at the end of fattening in the free-range system, especially in the Auburn animals.
3. The free-range system did not have a beneficial effect on a reduction of soiling.
4. The lighter alternative genotype in this study cannot yet be fully recommended for organic turkey fattening due to the high proportion of footpad lesions and soiling.



Thank you
for your attention!

Contact: christian.lambertz@fibl.org

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Feeding

Item	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
DM	90.8	90.7	86.5	87.2	88.0	88.2	87.4	87.2	88.7	87.1
Crude ash	81.0	82.0	68.0	67.0	70.0	63.0	58.0	60.0	53.0	52.0
Crude protein	280	278	245	246	216	218	188	186	170	163
Lysine	14.2	14.3	12.0	12.5	11.0	10.7	9.5	9.4	7.6	7.3
Methionine	5.0	4.8	4.3	4.5	3.9	3.9	3.4	3.3	2.9	2.7
AME _N (MJ) ¹	11.6	11.5	11.5	11.5	11.6	11.8	12.0	12.0	12.4	11.9
Lysine/AME _N (g/MJ)	1.22	1.24	1.04	1.09	0.95	0.91	0.79	0.78	0.61	0.61
Methionine/AME _N (g/MJ)	0.43	0.42	0.37	0.39	0.34	0.33	0.28	0.28	0.23	0.23
Riboflavin (mg/kg)	4.5	8.9	3.8	11.9	4.7	5.2	3.0	5.2	2.7	4.9