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DAFNAE
Department of Agronomy Food Natural
resources Animals and Environment



Behaviour of laying hens of two genotypes in a cage-free system enriched with hay bales

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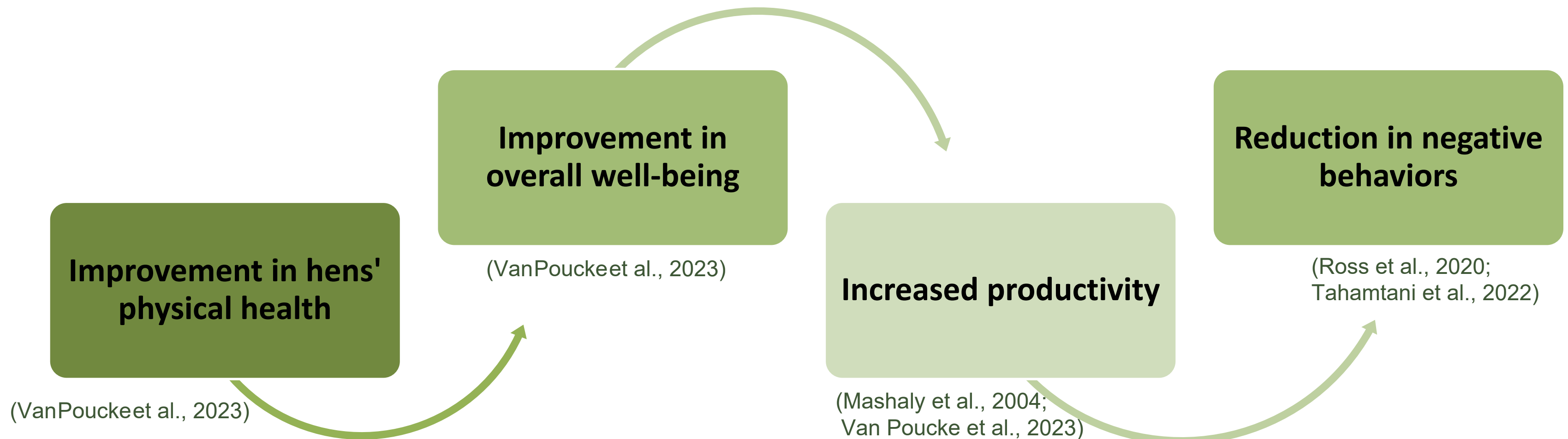
Section: *Health and Welfare*





Introduction

Environmental enrichment





Introduction

**Natural
behaviour**

(Campbell et al., 2019)

**Positive
aspects**



**Reduction
negative
behaviour**

(Mashaly et al., 2004;
Ross et al., 2020)

**Stress
reduction**

(Mashaly et al., 2004;
Van Poucke et al., 2023)



Introduction

Negative aspects



Additional costs for farmers

(Giersberg and Rodenburg, 2019)

Management and potential issues

(Giersberg and Rodenburg, 2019)

Variability in benefits

(Tahamtani et al., 2022)

Objective

Evaluation the behavior and welfare of two genotypes in a cage-free aviary system, with or without straw bales as environmental enrichment





Materials and Methods



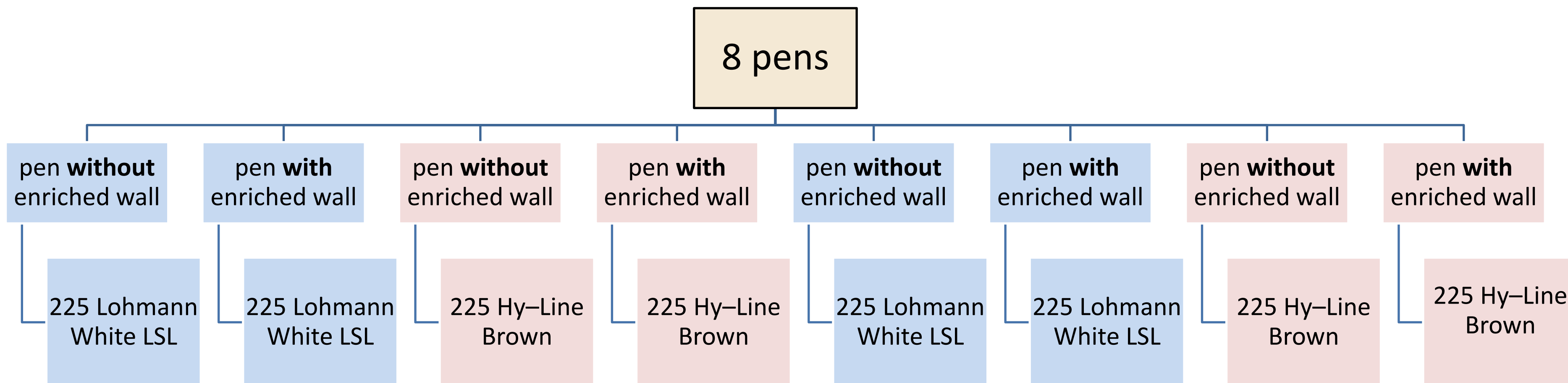
Experimental site

Aviary at the Experimental Farm
of the University of Padova (Legnaro, Italy)



Animals

900 hens *Lohmann White LSL*
900 hens *Hy-line Brown*



Materials and Methods



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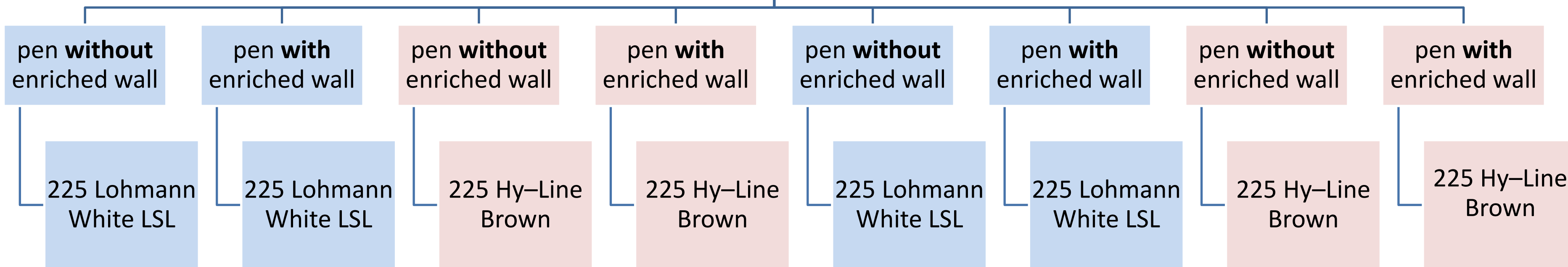


Animals

900 hens *Lohmann White LSL*
900 hens *Hy-line Brown*

50 and 51 weeks of age

8 pens



Materials and Methods



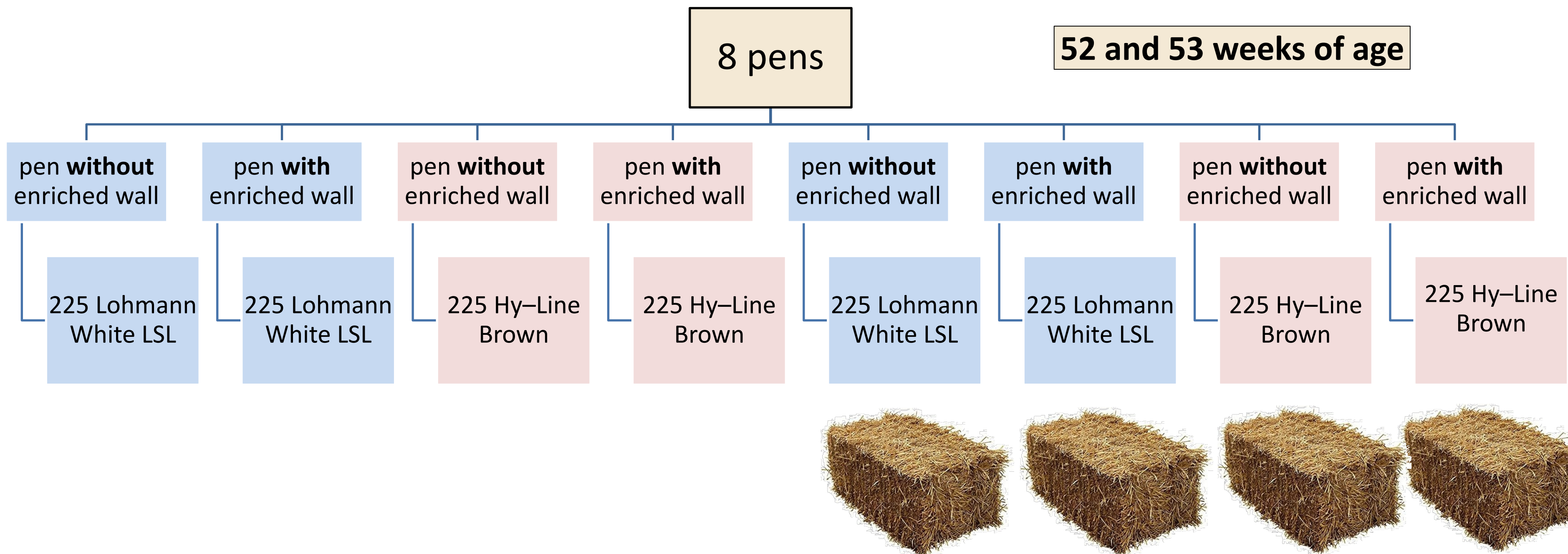
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Materials and Methods

Recording and video analysis

- Hens were video recorded for 24 hours twice a week from 50 to 53 weeks of age (8 recording days)
- The total number of hens on the floor and their visible behaviour (expressed in %) was recorded by taking a 10-second scan every 30 minutes for each hour of recording (from :00 to :30 of each hour) for each day



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Dustbathing

Interaction with the enrichment object

Pecking on the floor

Sitting inactive

Sitting pecking

Locomotion

Preening

Piling

Missing

Aggression

straw bales
(average weight 18.7 kg, 100 cm x 40 cm)

(Adapted from Baxter et al., 2019)

Statistical analysis

PROC GLIMMIX (SAS Institute Inc., 2013)

Fixed effects : genotype, presence of additional perches, environmental enrichment (straw balls) and the time-interval of observation (i.e., early, midday, afternoon, and late, corresponding to the intervals 5.30-8.30 h, 9.00-12.30 h, 13.00-16.30 h, and 17.00-20.30 h)

Random effects : the pen

Repeated effect : the week of age

Least square means were compared using Bonferroni's t-test.
Differences between the means with $P \leq 0.05$ were considered statistically significant.



Results

Effect of genotype on the number of animals observed on the floor (no. of hens present) and visible behaviour (observations referred only to daylight hours) (means $\pm$ SD).

Genotype (G)

	Genotype (G)		P-value
	 Brown	 White	
Hens on the floor, n	45.9 $\pm$ 12.3	35.8 $\pm$ 14.1	0.021
<i>Behaviours, (% observed hens)</i>			
dust bathing	1.69 $\pm$ 3.27	2.64 $\pm$ 5.58	<0.001
interaction with bales	4.00 $\pm$ 5.13	4.68 $\pm$ 7.18	<0.001
pecking on the floor	58.3 $\pm$ 16.9	63.2 $\pm$ 17.4	<0.001
sitting inactive	11.0 $\pm$ 9.35	6.85 $\pm$ 10.1	0.001
locomotion	8.92 $\pm$ 9.54	12.0 $\pm$ 10.0	n.s.
preening	12.3 $\pm$ 8.92	4.98 $\pm$ 5.42	<0.001
piling	1.64 $\pm$ 9.90	3.81 $\pm$ 11.9	0.028
aggression	0.13 $\pm$ 1.38	0.20 $\pm$ 1.54	n.s.



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Results

Effect of enrichment with straw bales on the number of animals observed on the floor (no. of hens present) and visible behaviour (observations referred only to daylight hours) (means $\pm$ SD).



Enrichment- Straw bales

	Absence	Presence	P-value
Hens on the floor, n	40.0 $\pm$ 13.8	41.7 $\pm$ 14.3	0.001
<i>Behaviours, (% observed hens)</i>			
dust bathing	2.40 $\pm$ 4.79	1.92 $\pm$ 4.37	0.016
interaction with bales	-	8.69 $\pm$ 6.35	<0.001
pecking on the floor	62.1 $\pm$ 18.3	59.4 $\pm$ 16.2	<0.001
sitting inactive	9.86 $\pm$ 11.1	8.00 $\pm$ 8.46	<0.001
locomotion	11.9 $\pm$ 10.7	8.98 $\pm$ 8.70	<0.001
preening	8.79 $\pm$ 8.21	8.48 $\pm$ 8.26	n.s.
piling	2.62 $\pm$ 10.98	2.83 $\pm$ 11.0	n.s.
aggression	0.13 $\pm$ 1.17	0.20 $\pm$ 1.71	n.s.



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	Time Slot				P-value
	Early	Midday	Afternoon	Late	
Hens on the floor, n	37.6 ^A ±12.9	37.5 ^A ±13.7	46.3 ^C ±14.3	41.6 ^B ±13.6	<0.001
<i>Behaviours, (% observed hens)</i>					
dust bathing	0.06 ^A ±0.50	2.87 ^B ±4.90	4.17 ^D ±6.13	1.28 ^C ±3.31	<0.001
interaction with bales	4.69 ^{BC} ±6.26	4.17 ^{AB} ±5.89	5.01 ^C ±7.69	3.53 ^A ±4.71	<0.001
pecking on the floor	58.1 ^B ±16.2	57.3 ^B ±17.6	54.5 ^A ±16.6	72.7 ^C ±12.1	<0.001
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Conclusions

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Enrichment

Time-of-Day





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Time-of-Day





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Enrichment

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Time-of-Day

Significant diurnal variations were observed, with more hens active on the floor in the afternoon (13:00h-16:30h).





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BA

**Thanks to all for
your attention**



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Wall with additional vs. standard wall perches



B E H A V I O U R	<i>Dustbathing</i>	Hen forced the sand or other materials into the plumage by squatting on the ground and making appropriate movements with the body, wings and foot
	<i>Interaction with the enrichment object</i>	Scratching and pecking at the straw bales (from a standing or walking position)
	<i>Pecking on the floor</i>	Peck on the floor (where present: forage on the floor)
	<i>Sitting inactive</i>	Sitting with no other activity
	<i>Sitting pecking</i>	Sitting and ground pecking
	<i>Locomotion</i>	Standing or walking(running), with no other pecking or scratching activity
P A T T E R N	<i>Preening</i>	Hen directs its beak to its plumage of several body parts (thorax, abdomen, shoulder, interior and exterior wings, rumps, back, and cloaca) and carries on pecking, nibbling, combing or rotating movements, once or repeatedly.
	<i>Piling</i>	Three or more mostly immobile (maximal movement duration <5 s) hens standing in the closest possible proximity (overlapping of body outlines) with most hens facing in the same direction.
	<i>Missing</i>	Unable to record the state of the hen because the location of the hen is lost, or hen is temporarily out of sight.
	<i>Aggression</i>	Fights including pecking at another hens