



BTSF Better Training for Safer Food *Initiative*

Animal welfare in poultry production (chickens kept for meat production) – IV Session

Rome 22-24 November, 2023

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Risk factors affecting the welfare of broiler chickens on farm:
- stocking density-litter quality- management

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BTSF Direct and indirect effects of stocking density in growing poultry

Density

- **Direct effects**

- Physical coverage of available space
- Physical disturbances
- Psychic disturbances

- **Indirect effects**

- Increased excretion of water and nitrogen
- Decrease of litter dry matter
- Deterioration of litter structure
- Increase of ammonia Development and dust
- Increase of litter temperature

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Density

Low density (20 kg/m²)



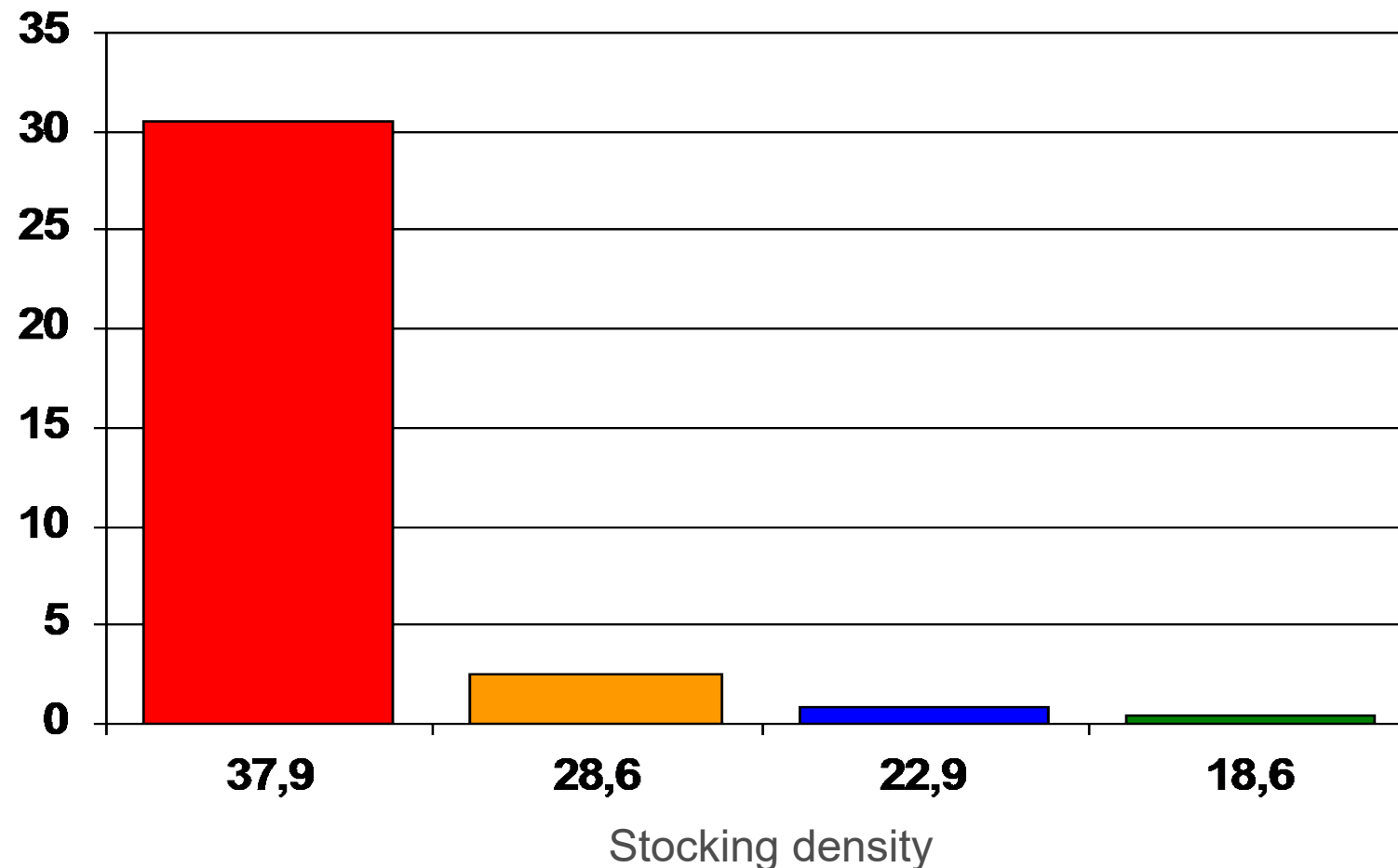
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High stocking density (40 kg/m²)

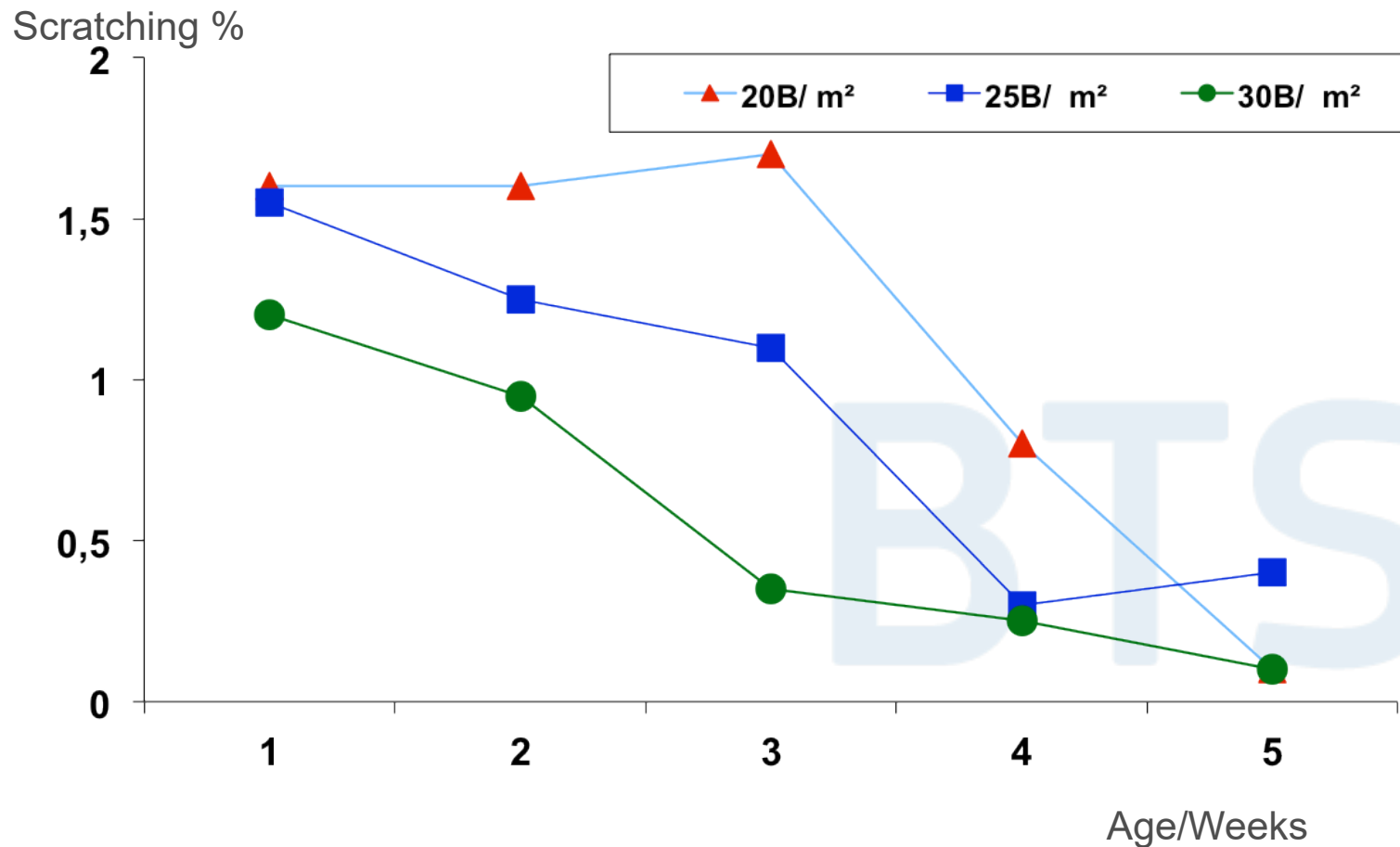


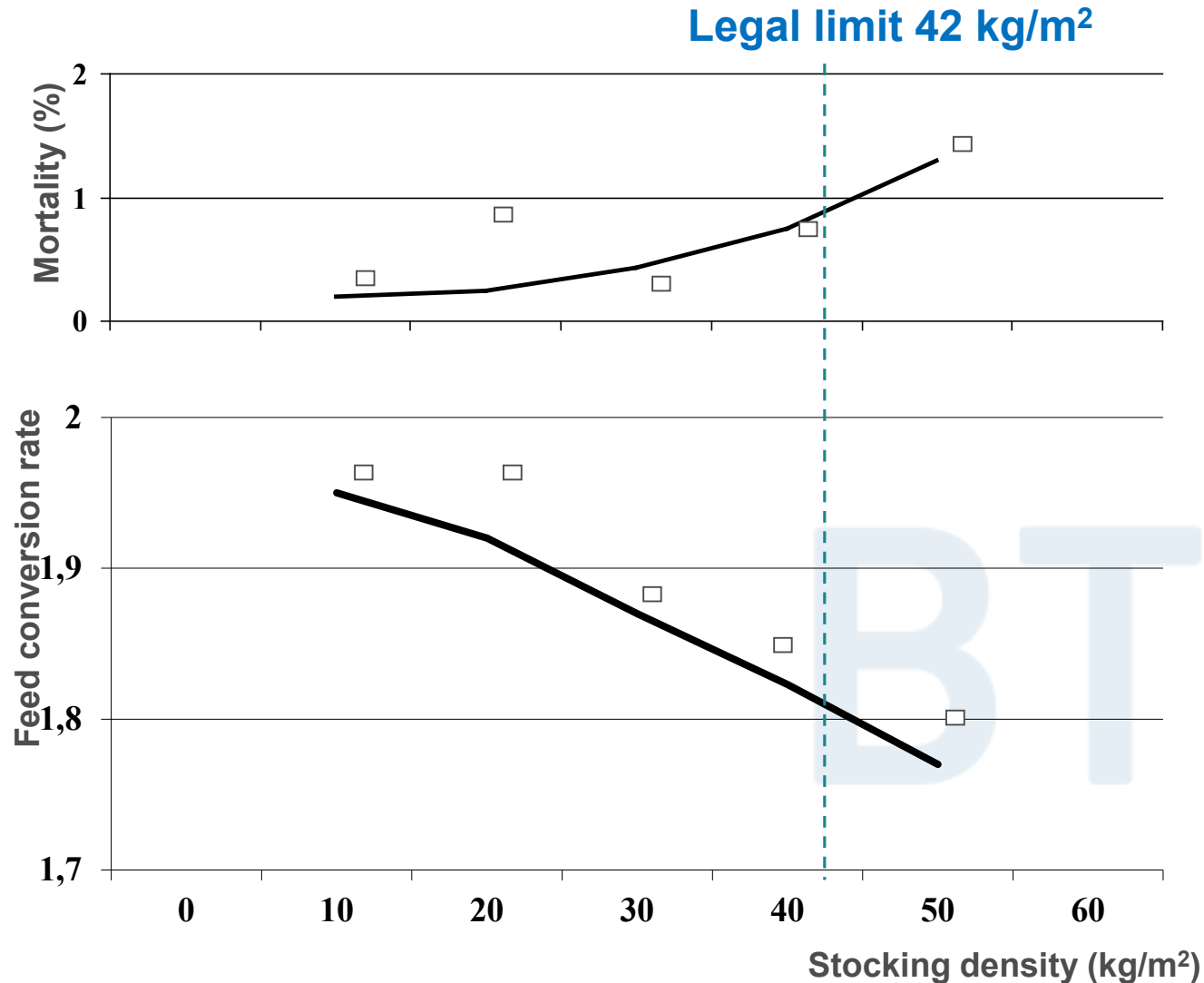
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The influence of stocking density on the percentage of carcasses with breast blisters and burns (Cravener et al., 1992)



The influence of stocking density (birds/m²) on scratching behaviour from 1 to 5 weeks of age (Bessei, 1992)



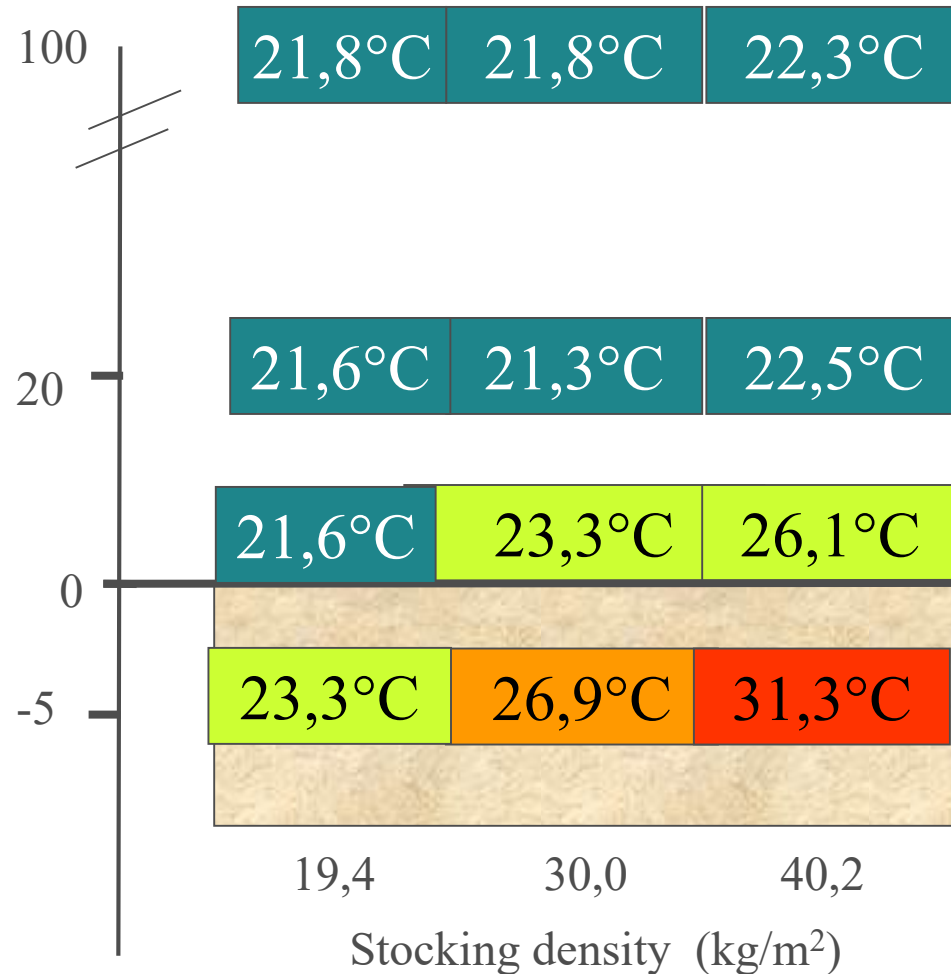


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Density

- Comfort behaviour is highly correlated with appropriate stocking densities, which indirectly contribute to the litter quality and space allowance of an individual to perform stretching, dustbathing
- a preventive measure will be to provide dry and friable litter from day one onwards and ensure that the litter will stay in the same condition until the end of rearing (Pepper and Dunlop, 2021).
- Optimal stocking densities (Gholami et al., 2020), coupled with suitable litter and housing management, contribute to the welfare of broilers by facilitating the expression of comfort behaviors (Pepper and Dunlop, 2021).

Height over
litter (cm)



**The influence of stocking density
on temperature at different
sites of the broiler house
(Reiter und Bessei, 2000)**

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Litter

Scaleless Sc



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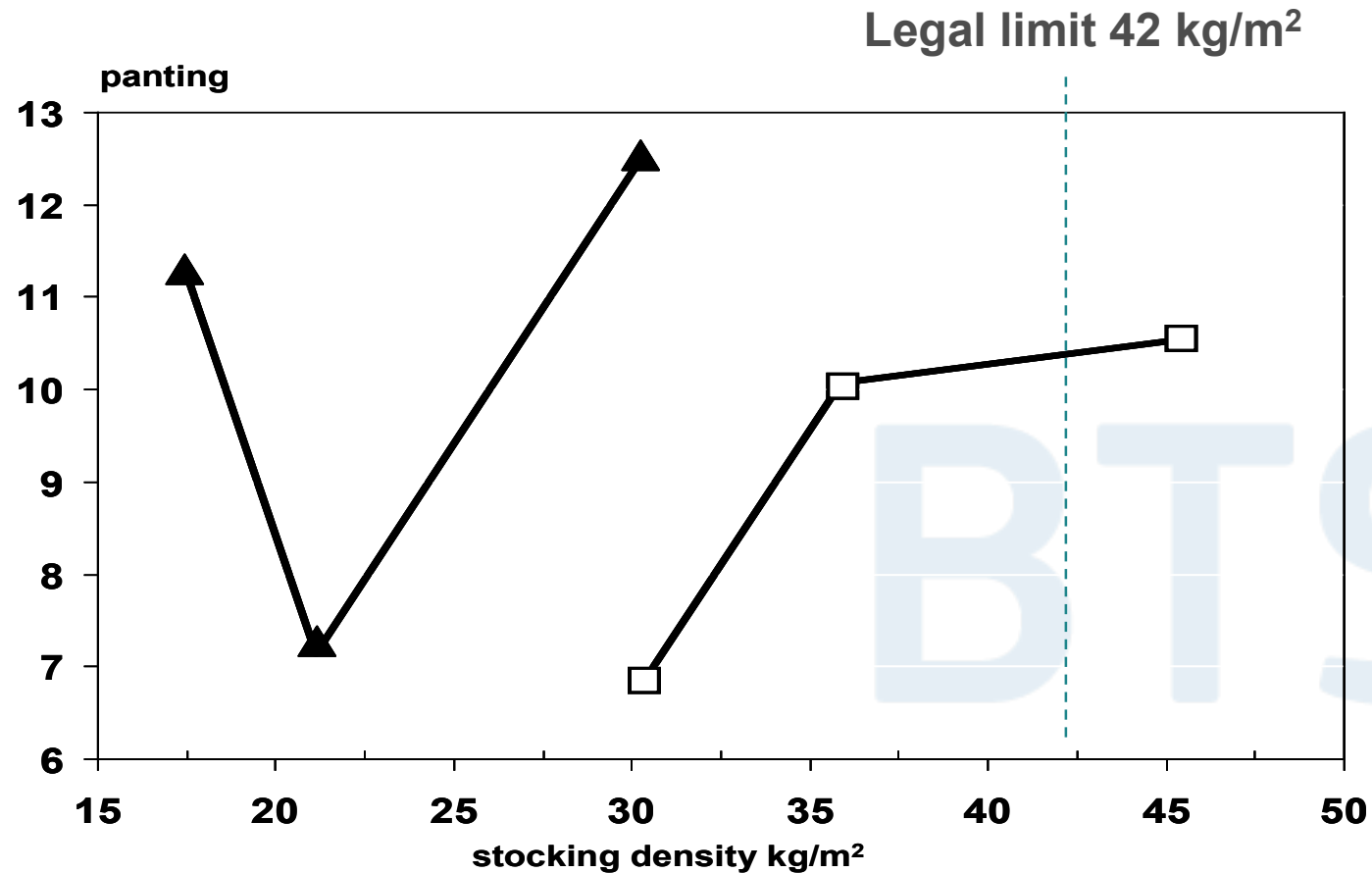
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Stocking density (kg/m ²)	Litter Temp	Birds/m ²	Box Area (m ²)	Animal Genotype
18,6	Low	8	3,22	Feathered
23,2	Medium	12	3,22	Feathered
32,4	High	17	3,22	Feathered
30,2	Medium	13	2,24	Featherless
36,6	High	17	2,24	Featherless
47,5	Very High	23	2,24	Featherless

(Lolli et al., 2010)

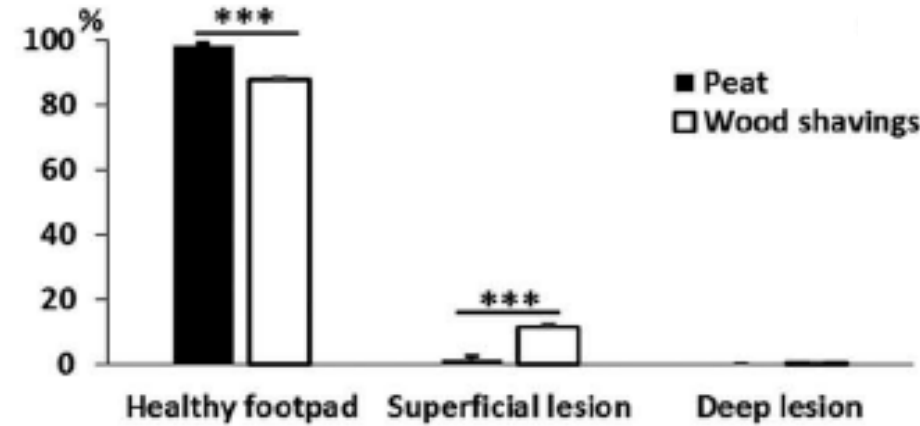
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Mean duration (sec) of panting in response to line (feathered (▲); featherless (□)) and stocking density (Lolli et al., 2010)

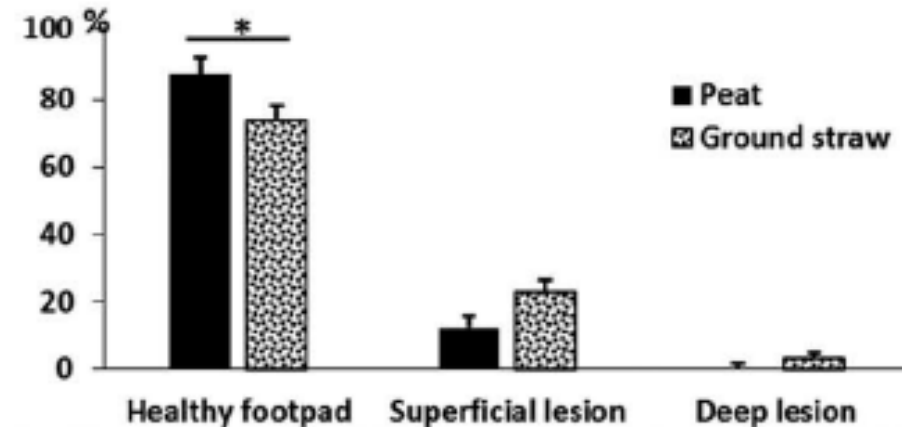


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Distribution of footpad lesion scores in broilers on peat compared with wood shavings and ground straw. (Kaukonen et al. 2017)

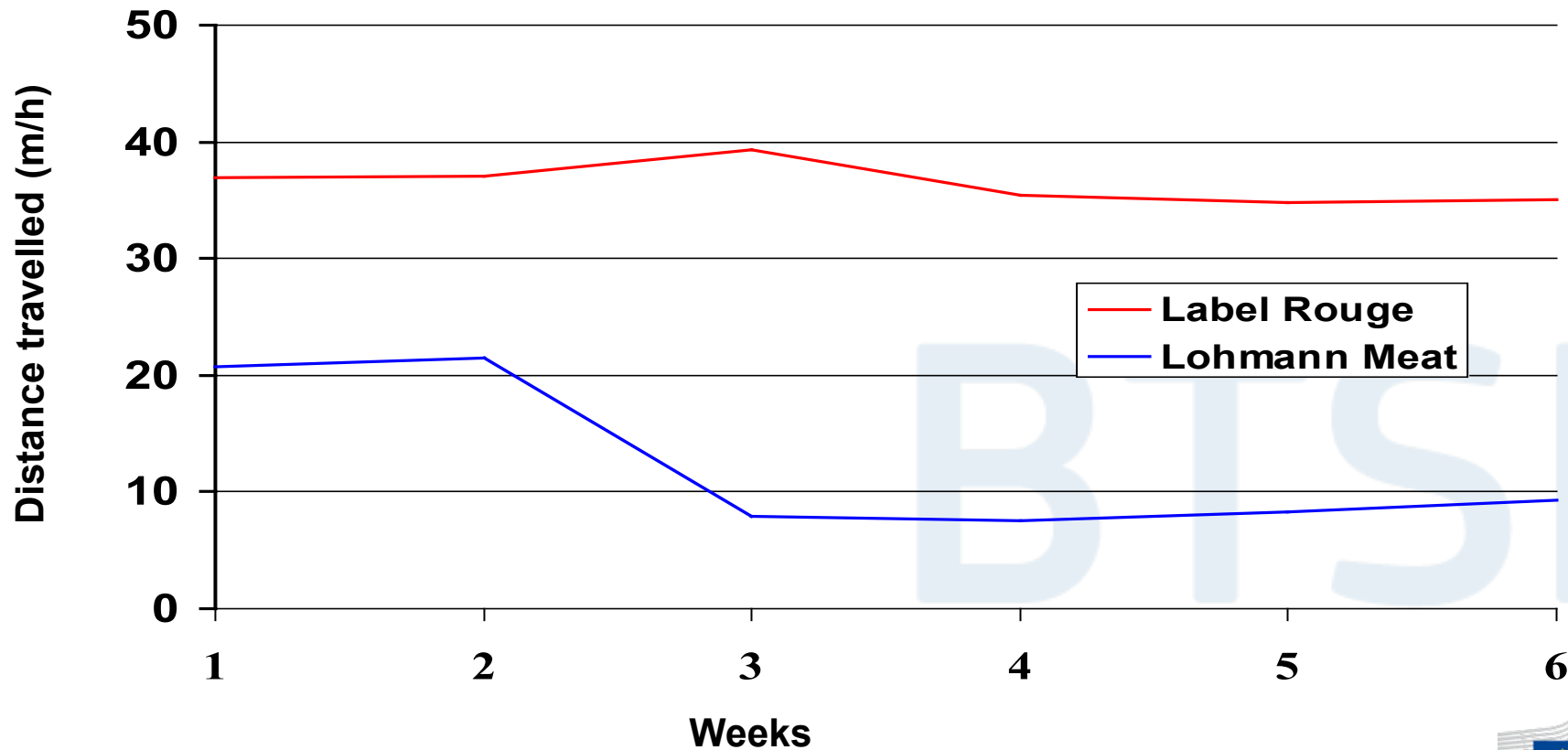


39 kg/sqm



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Management



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Increase of distance between feeder and drinker from 2 to 12 m

Management



Effect of distance between feeder and drinker (Reiter 1996)

	2 Meter	12 Meter
Live weight g	2022,0	2014,2
Culled for leg disorders %	3,2 ^a	2,7 ^b
distal angulation tibia °	6,4 ^a	5,3 ^b
Corticalis thickness mm	0,4 ^b	0,9 ^a

BTSF Footpad lesions of different scores



After L. Berg, Sweeden

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Management

Breast blisters scores from 1, left, 2 central,
3 right (Lorenz, 2010)



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Effect of rearing condition variables on the prevalence of foot-pad dermatitis at time of slaughter in broilers (after Ekstrand et al., 1997)

Variable		Mean \pm SD	Statistical Significance
Litter quality	Dry Wet	35,4 \pm 23,6 75,5 \pm 15,9	*
Litter depth	5cm or less more than 5 cm	36,4 \pm 19,4 80,7 \pm 13,3	*
Type of litter	Wood shavings Straw	36,0 \pm 28,1 42,2 \pm 19,3	n.s.
Litter added during the rearing period	Yes No	40,0 \pm 17,9 37,5 \pm 24,5	n.s.
Type of water system	Nipples Smal cups	34,3 \pm 26,6 45,2 \pm 18,8	*
Stocking density	23-27 kg/m ² 28-32 kg/m ²	33,4 \pm 26,3 42,3 \pm 26,8	n.s.

High incidence of FPD

- „Toys“
- **Hay or straw baskets**
- **Barrier**
- **Perches**
- **Raised platforms**
- Free range
- Sequential feeding
- **Scattering of pellets or grains**

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Increasing environmental complexity in the form of barrier perches had clear benefits for broilers, not only by providing **behavioral opportunities** in the form of perching, but also by **controlling aggressive interactions** and **reducing disturbances**, especially at higher rearing densities.

A more even distribution of broilers may be achieved by providing barrier perches, which also have the benefit of decreasing aggression (Ventura et al., 2012).

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- The use of **elevated structures** may not only enhance the natural behavior of chickens but also improve litter quality. Natural behaviors, including exploratory and foraging behaviors, can prevent the clumping of litter.
- Elevated structures also satisfy the need of the birds for elevated positions to perceived predation stress and thus offer an alternative to perches.

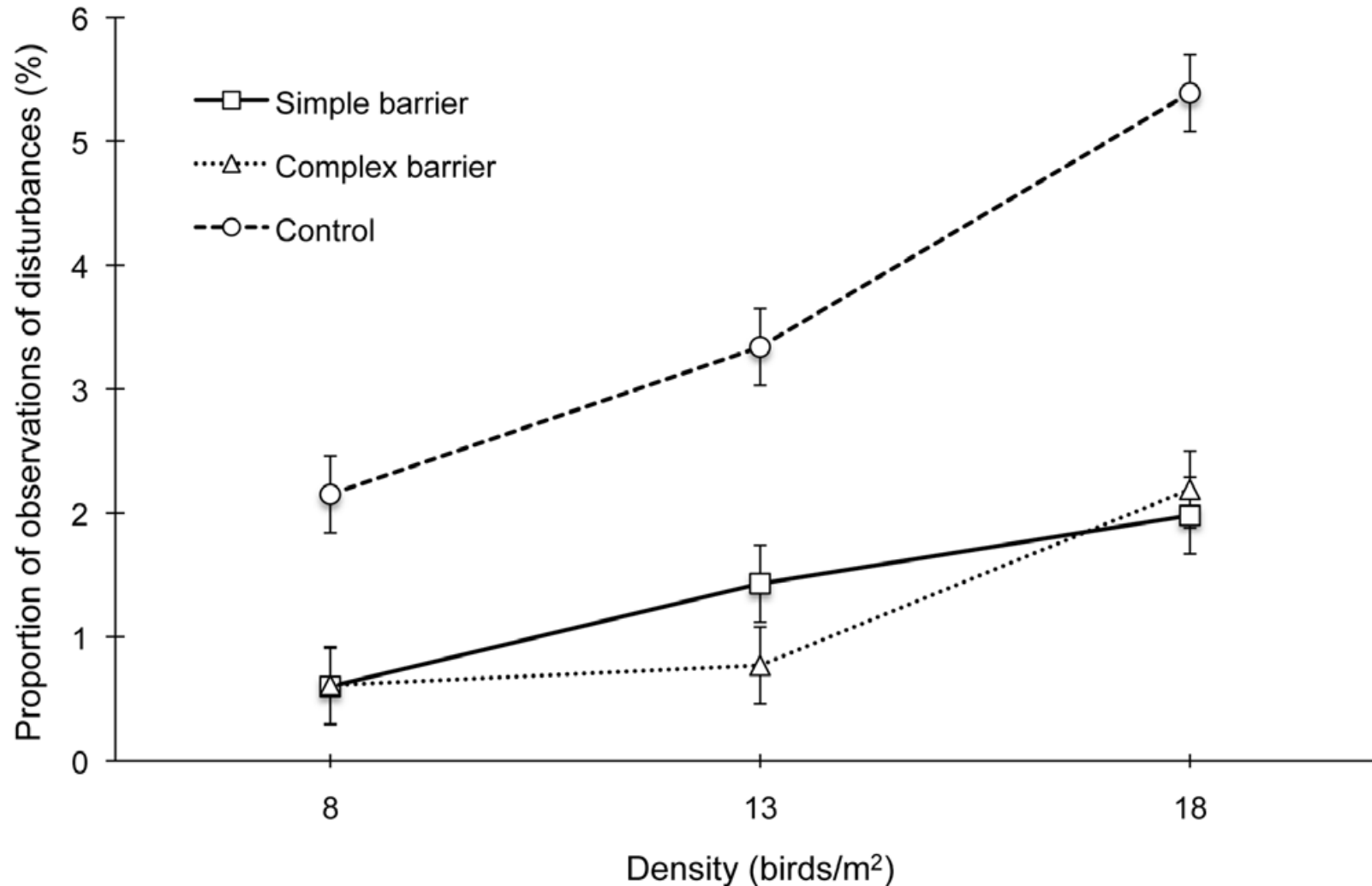
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- **straw bales** that encourage the birds to exhibit foraging as well as exploratory behaviour (Riber et al., 2018).

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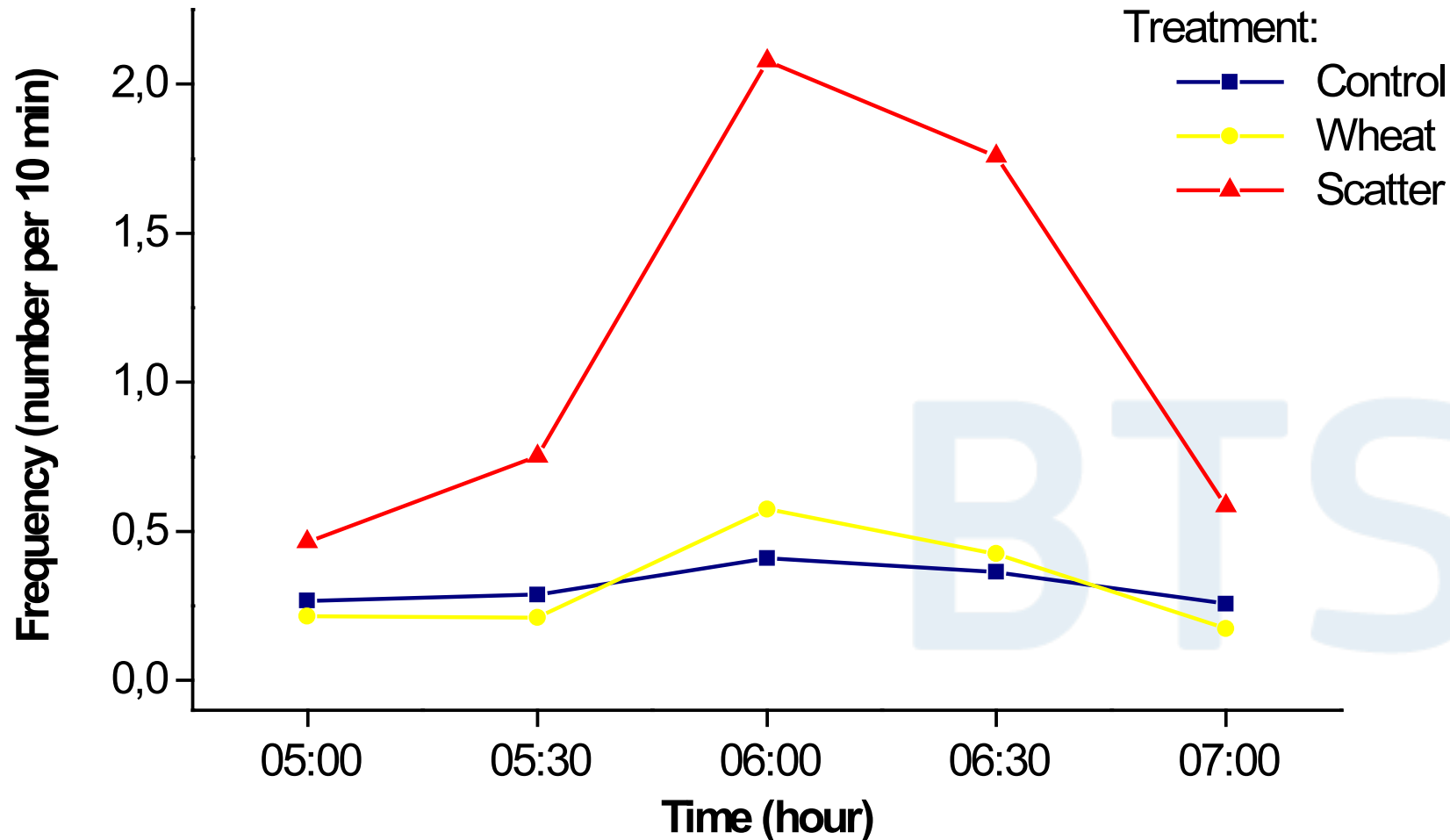
Barrier by density interaction effect on mean percent disturbances (LSM \pm SEM). B. A. Ventura et al. 2012

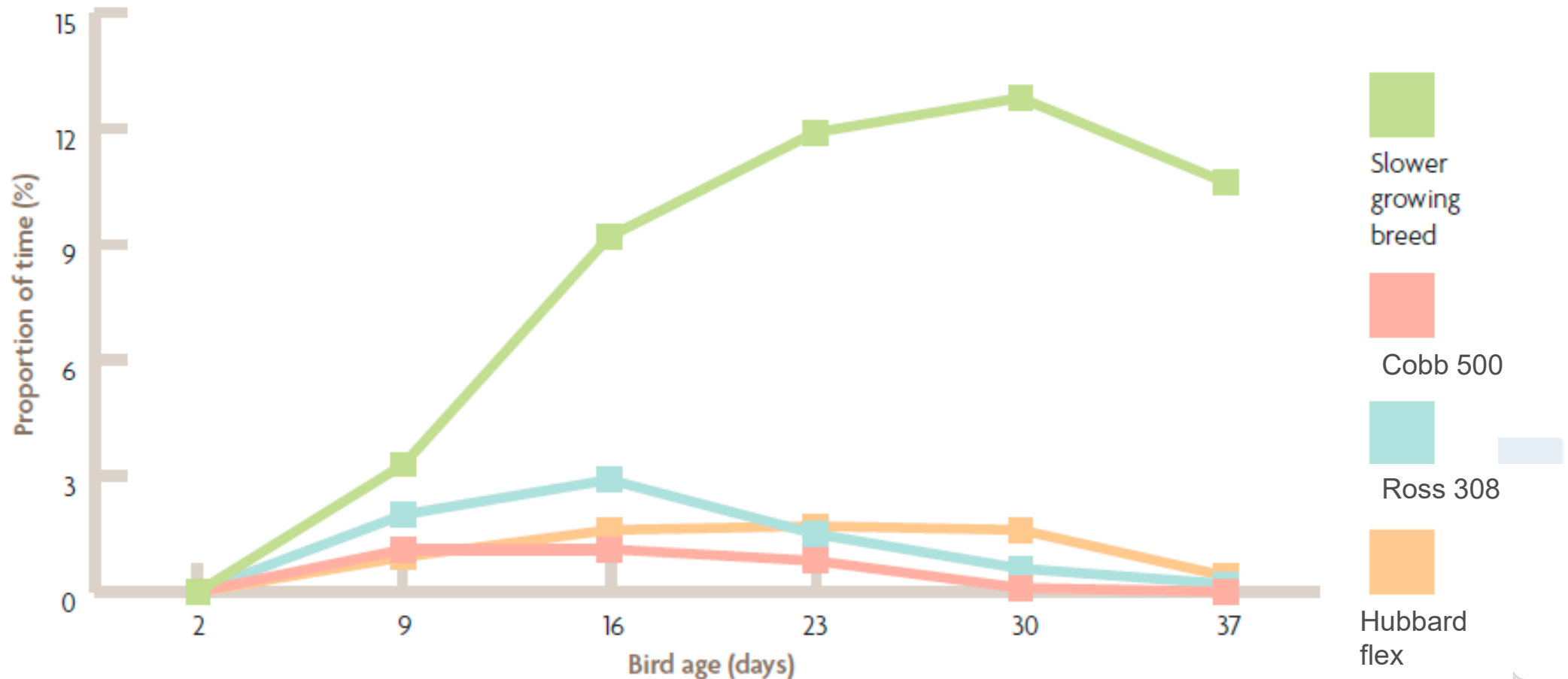


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- Offering food enrichment could enhance foraging behaviour (Pichova et al., 2016).
- Jordan et al., 2011 demonstrated that scatter pelleted feeding may improve walking ability in broiler
- Recently Wood et al. (2021) stated that is unclear if scatter feeding will show long-term effect.

Influence of scattered pelleted feed on walking behaviour of broilers (Jordan et al., 2011)





- The average DoA of broilers registered in EU ranges from 0.12% to 0,46% (Ferrarini et al., 2002).
- Higher mortality seems to be related to extreme weather conditions.
- Among the causes of DoA a great importance assume: heat stroke, smothering, **injuries during loading**, spontaneous mortality, microclimate.

- Normally broilers are caught by legs, inverted and carried in bunches of 3-4 per hand to the crates.
- Inversion may cause fear (TI, Zulkifli et al., 2000).
- Consequences → stress-dislocated hips – injuries.
- Most catching and handling procedures could cause pain.
- Violent handling with an energetic struggle response
- may result in a capture myopathy.

- Broiler chickens should be caught in sheds in which the lighting has been reduced and should be placed in crates in a manner which minimises avoidable movement of the chicken and prevents injury and distress.
- If broiler chickens are loaded by hand, up to 5 chickens of less than 2 kg per bird are carried in one hand and up to 3 chickens when they are heavier than 2 kg. The other hand is used to support the body weight (European Commission, 2018)
- According to EFSA recommendation when manually handled, chickens for meat production should be carried upright, by maintaining the wings close to the body, and not being held by their neck or wings, or inverted. No birds should be swung, thrown or dropped during the process of handling (EFSA, 2023).

- It is important that poultry are in proper condition before transport. A particular concern is that birds should not be **wet** when loaded.
- The effects of cold exposure are worse if birds are wet. Moisture does accumulate during transport, so it is vital that their plumage is dry before transport begins. Producers should adjust heating and ventilation in the barns appropriately to ensure this.

- The majority of problems in poultry for meat production is related to stocking density
- Fast growing lines, feeding and lighting programmes contribute to a decline in locomotor activity and increasing time spent sitting in the litter.
- According to recent EFSA opinion (2023) stocking density influences the welfare mainly in relation to the restriction of movement, inability to perform exploratory and foraging behaviour , 'inability to perform comfort behaviour and soft tissue and integument damage.

Litter management deserve more attention:, a good litter management, including the provision of new low-dust litter substrate, will support litter quality.

Dry litter is also important to absorb the moisture from the faeces and prevents contact dermatitislike hock burn and FPD.

Permanent access of all birds to dry and friable litter at all times, will allow the broiler to meet its behavioural needs. Rescattering of additional fresh litter after week 2 may be necessary.

The provision of new litter stimulates the birds to be active showing its natural behaviour.

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- Foot pad lesion seem to be a usefull indicator for poor litter management.
- The scoring at the slaughterhouse has opened the possibility for automated systems to assess the extent of the dermatitis (Vanderhasselt et al., 2013; Kaewtapee et al., 2021).
- Automated systems mean that more birds can be assessed per flock and reliability of scoring is higher.

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Thank you

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