

Animal Welfare Challenges in Broiler Breeders with Special Focus on Restricted Feeding and Behaviour

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Comparison of performance of parent stocks under restricted and ad lib. feeding regimes

Criteria	restricted	ad libitum	Source
Live weight (kg, 20/40 weeks)	2,0 / 3,0	5 / 5	Bruggeman et al. (2005)
Feed intake (g/Bird/Day)	140/160	>200	
Laying rate (%)	79,1	52,4	Puterflam et al. (2006)
Multiple egg yolks (n)	2,5	7,6	Puterflam et al. (2006)
Erratic oviposition /defective egg syndrom	-	+++	Robinson and Wilson (1976)
Mortality (%)	5 (7)	30 (68)	Puterflam et al. (2000) Sacher (2008)

Definition of hunger

- Hunger is a
“negative subjective state experienced by an animal that is chronically under nourished”

D`Eath et al. (2009)

Methods of feed restriction

Quantitative restriction (from 100 – 25 %)

Qualitative restriction

- Dilution with fiber or sand
- Suboptimum CP contents

Reduction of access to water

Appetit reducing substances (Ca-propionate, Na-Monensin)

Physiological criteria used to assess hunger in broiler breeders

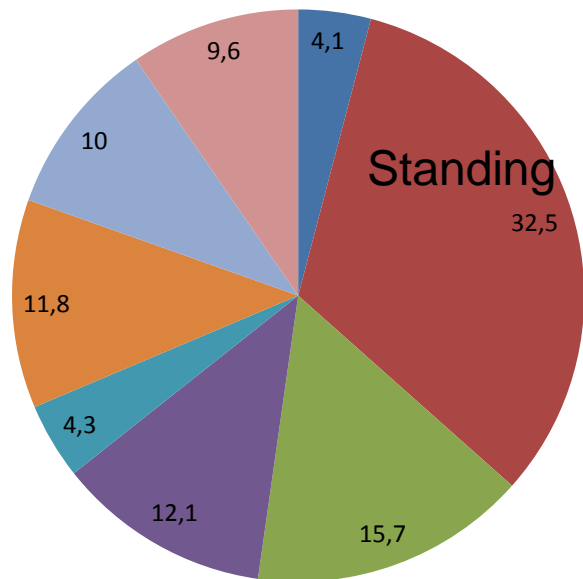
Criteria	Comments
Glucose NEFA (non-esterified fatty acids)	These criteria have an important role to play in feed intake regulation. There are, however, controversial results under restrictive feeding conditions
Glucose /NEFA-ratio	
Stress <ul style="list-style-type: none">• Corticosteron• Heterophile:Leucocyte ratio (H/L)• Basophile; Monocytes• Creatinkinase• Response to antigens	The glucocorticosteroids are important for the metabolic turnover and respond changes in nutrient supply; their relation to psychic stress is covered by the changes of the metabolic rate under restrictive feeding
Heart rate Electroencephalogramme (EEG)	idem not sufficiently investigated

Behavioural criteria

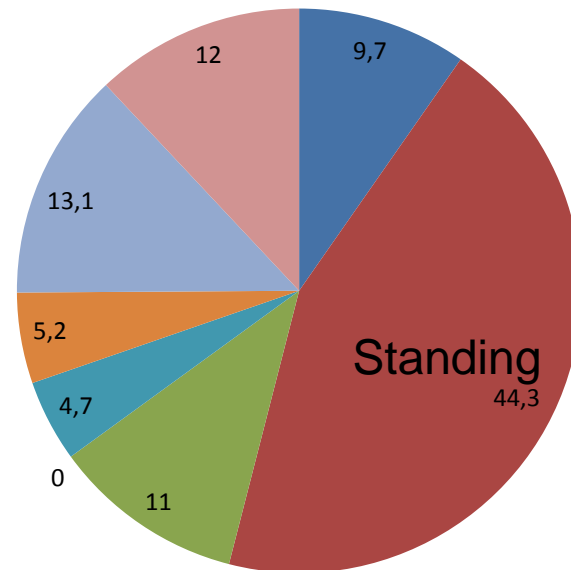
Criteria	Comments
Feed intake/feeding behaviour <ul style="list-style-type: none">• Difference between ad lib. and restricted feeding• Intensity of feed intake (speed)• Duration of meals• Compensatory feed intake• Operant feed intake• Conditioned preference of feeding place	Behaviours do not change proportionally to the level of feed restriction
Other behaviours <ul style="list-style-type: none">• Locomotor activity, litter pecking (exploration)• Water intake/drinking behaviour• Object pecking (feeder, drinker, walls, pen mates) Aggression <ul style="list-style-type: none">• Preening• Reactivity/Fear• Stereotyped behaviours	Changes may occur as compensatory activities; stereotyped behaviour is considered the most prominent indicator of compromised welfare
Behavioural sequences <ul style="list-style-type: none">• Detrended Fluctuation Analysis (DFA)• T- Pattern	Variability of behaviour is considered an indicator of wellbeing

Time budget in broiler breeders under restricted and ad lib. feeding regimes during rearing before feeding (Puterflam et al., 2006)

ad libitum



restricted

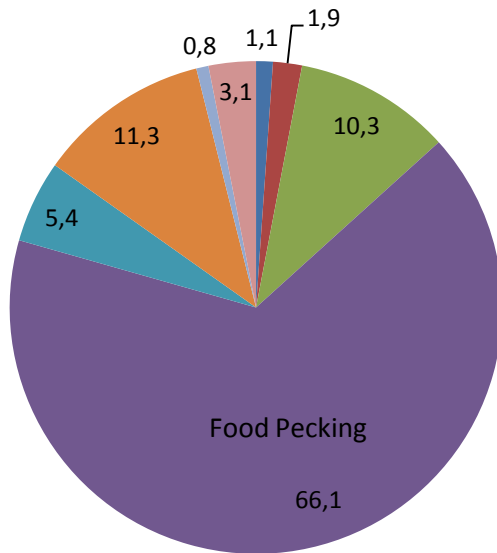


- Laufen
- Stehen
- Ruhen
- Futterpicken
- Trinken
- Federputzen
- Trogpicken
- Umweltpicken

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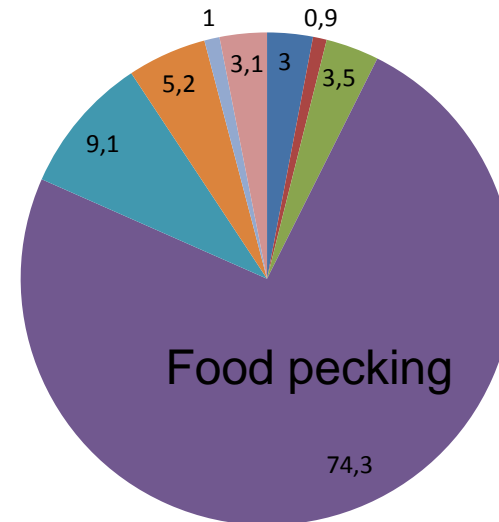
Time budget of broiler breeders under ad libitum und restricted feeding during the feeding time (rearing period) (Puterflam et al., 2006)

Ad lib.



- Laufen
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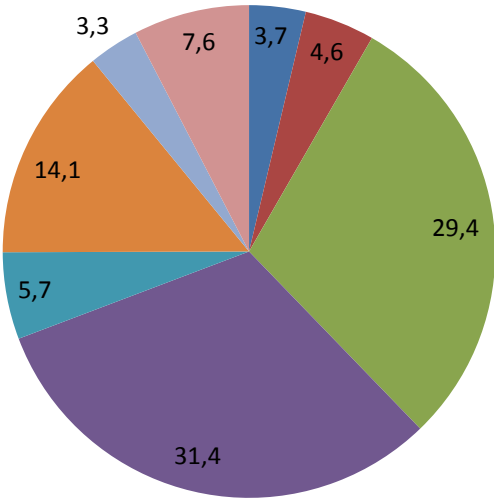
Restricted



- Laufen
- Stehen
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- Trinken
- Federputzen
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- Umweltpicken

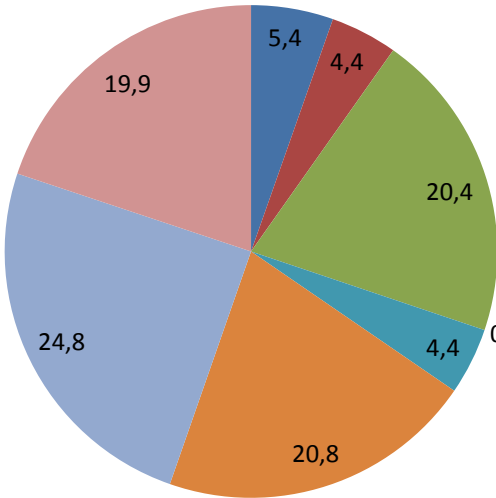
Time budget of broiler breeders under ad libitum und restricted feeding after the feeding time (rearing period) (Puterflam et al., 2006)

ad lib.



- Laufen
- Sitzen
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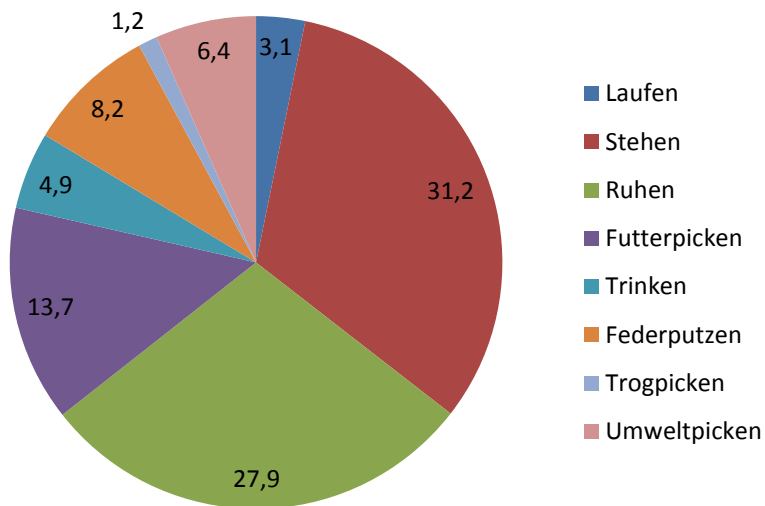
restricted



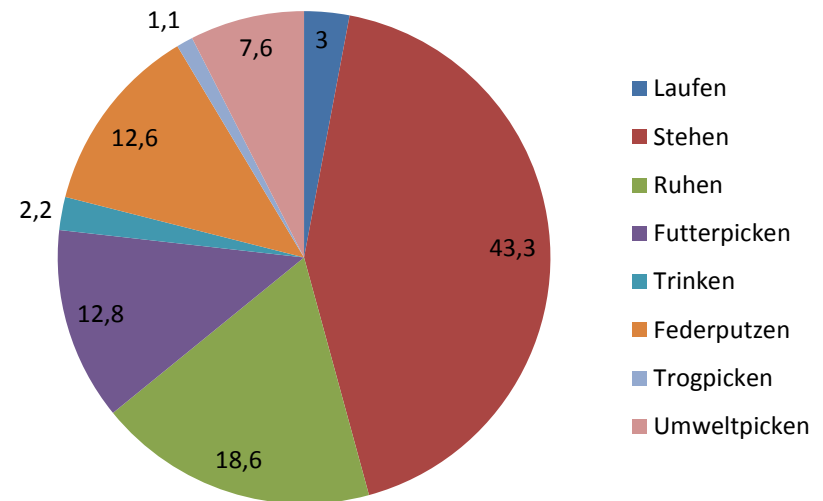
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Time budget of broiler breeders under ad libitum und restricted feeding during the feeding time (laying period phase 1) (Puterflam et al., 2006)

ad lib.

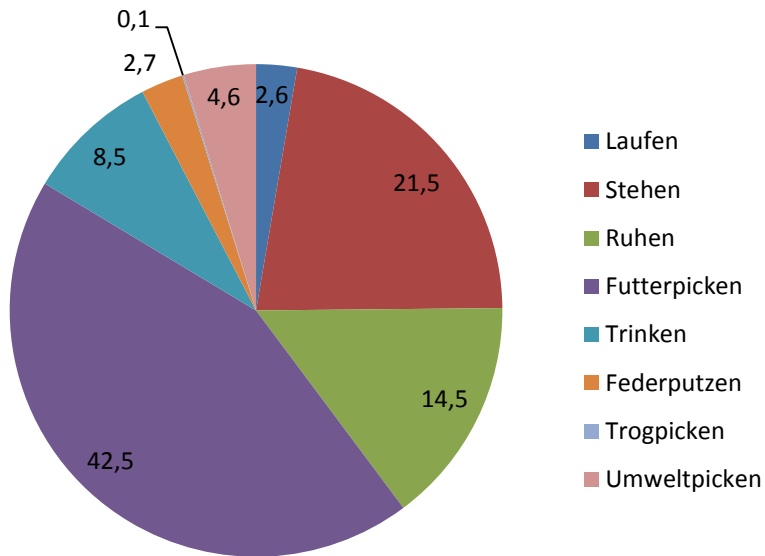


restricted

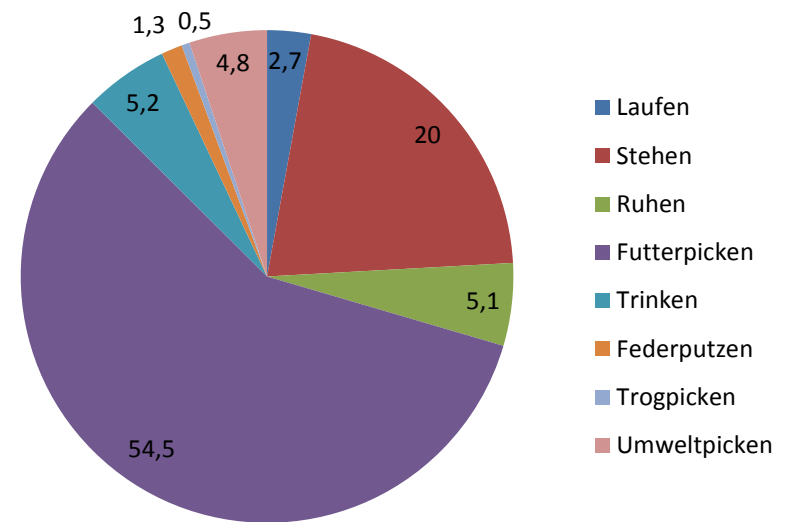


Time budget of broiler breeders under ad libitum und restricted feeding during the feeding time (laying period phase 2) (Puterflam et al., 2006)

SA

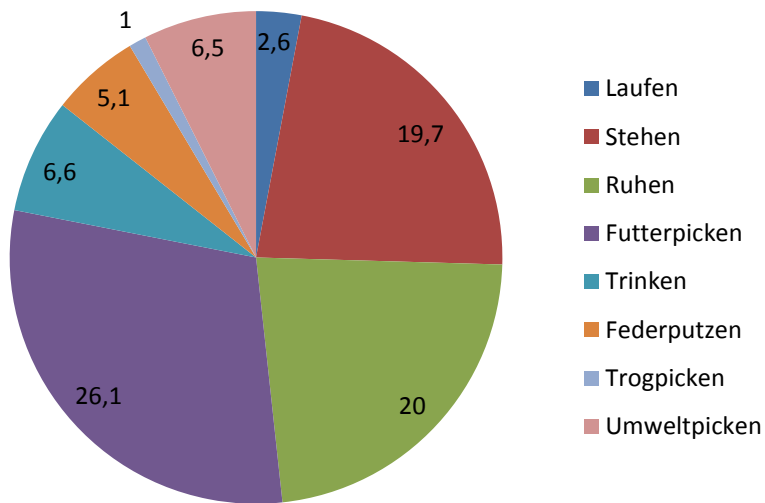


SR

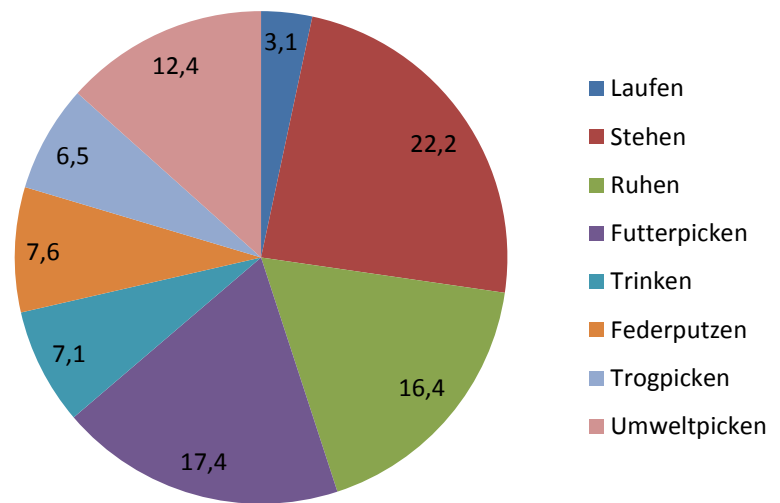


Time budget of broiler breeders under ad libitum und restricted feeding during the feeding time (laying period phase 3) (Puterflam et al., 2006)

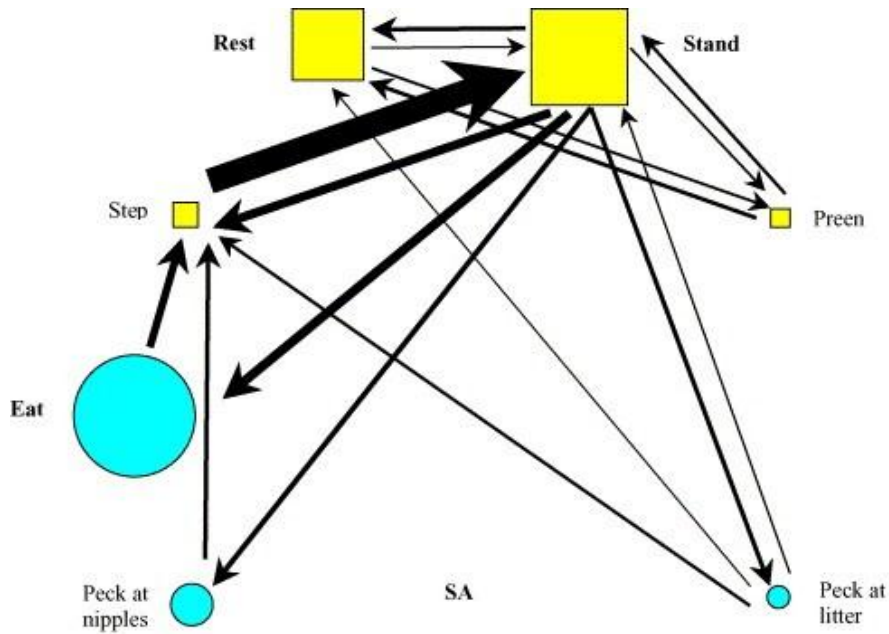
ad lib.



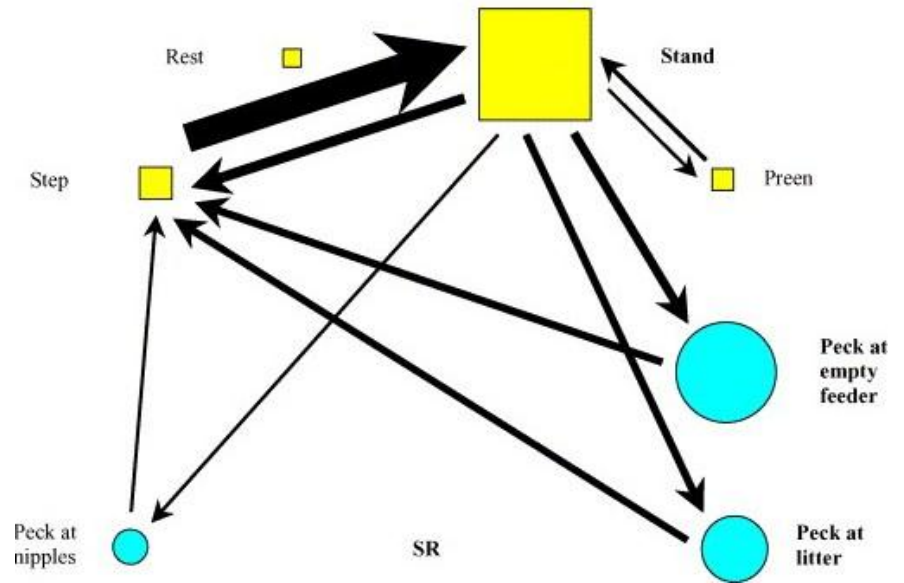
restricted



Behavioural sequences of parent stocks under ad lib. feeding (Merlet et al., 2005)

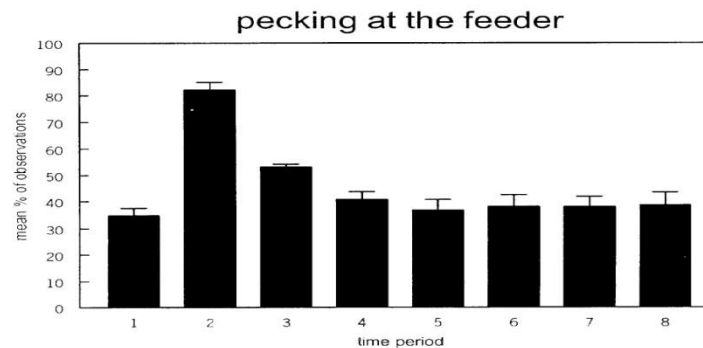
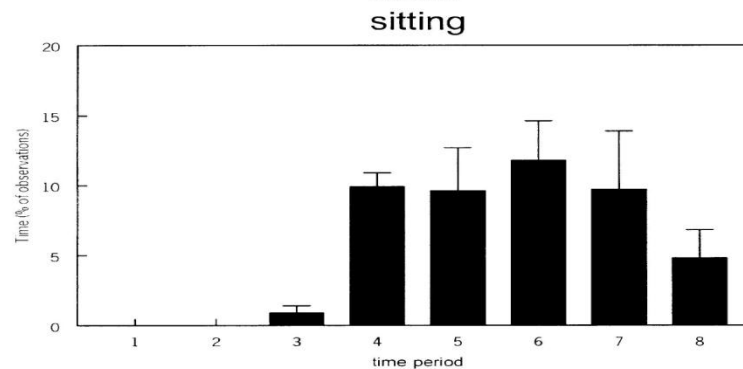
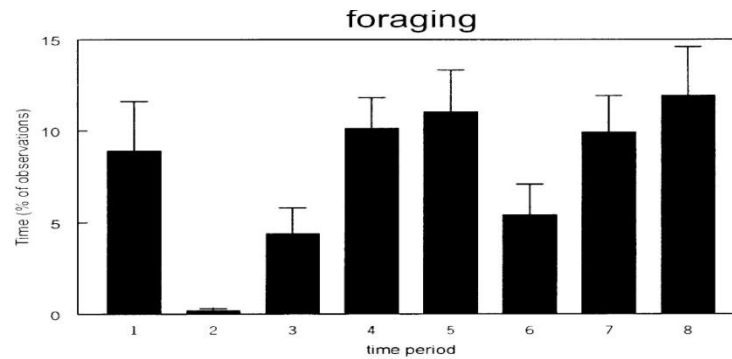


ad libitum



restricted

Time (mean \pm S.E.M.) spent by broiler breeders at the age of 6 weeks on foraging behaviour, sitting and pecking at the feeder during eight observation periods between 07:30 and 15:00 h in the light period (de Jong et al. 2005)



Regulation of feed intake in the Domestic Fowl (Grossmann, 1986)

Pre-absorptive phase	Short increase of glucagon und insulin, peak within 1 the decline
Absorptive phase	Action of Cholecystokinin, gastrin and sekretin Secondary excretion of insulin Peak ca. 45 min. after start of the meal
Post-absorptive Phase	Decline of insulin und glucagon Increase of somatostatin

Conclusions

- **Hunger is a subjective feeling and cannot be directly assessed by physiological and ethological criteria**
- **The physiological criteria which are involved in the regulation of feed intake and metabolix turnover have shown no clear responses towards different levels of feed restriction**
- **The most accentuated response of behaviour to feed restriction is the increase of feeding intensity and the reduction of time spent feeding**
- **Depending on severity of restriction and age the time spent feeding varies between 0,5 and 5 hours and is highly concentrated in the time after feed allocation. In ad lib. fed birds the time spent feeding is much longer and scattered over the hole light (and dark) period**
- **The shorter feeding time is compensated by pecking at the litter, feeders, drinkers and other objects.**
- **This behaviour is adopts often a stereotyped pattern and is considered an indicator of poor welfare**

Conclusions (continuation)

- **Attempts to extend the time spent feeding in feed restricted birds have not been successful so far (the methods were either not efficient in controlling the body weight, or not efficient in reducing stereotyped behaviour)**
- **It has been proposed to redirect food pecking towards explorative litter pecking, which is a normal behaviour**
- **This strategy has to focus on the time immediately after the termination of the ration**
- **The applicability under practical conditions has to be explored more in detail**