



Poultry  
SIGNALS®

# BROILER SIGNALS

A PRACTICAL GUIDE TO BROILER FOCUSED MANAGEMENT



## Poultry SIGNALS®

### **Broiler Signals**

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# Seeing more by looking more closely



**Broilers grow incredibly fast and there is almost no time to fix mistakes. So you have to start by making sure you have everything in place to receive the young chicks and prevent things from going wrong later on. And if there is a problem, respond to the signals fast so you can make the necessary adjustments. Or in any event learn from them for the next cycle.**

*You want to identify irregularities as soon as possible so as to avoid problems.*

### Use all your senses

If you only look out for technical aspects (daily growth, feed and water consumption, etc.), you may miss other important signals from the broilers and their living environment. Always use all your senses. Even before you enter the broiler house, you'll hear whether the birds sound different. Stand outside the door for a moment; don't go inside straight away. Look through the window and listen without disturbing the flock. Pay attention to the distribution of the birds. When you go in, you'll smell whether the climate in the house is OK or if there is a problem with the manure or the ventilation. Use your eyes and ears to see and hear how active the birds are and whether they are reacting more, less or differently to your arrival than usual. Also use your senses to observe the heat and cold or draught in the broiler house. Every irregularity needs to be attended to.







## Picking up the signals

You'll pick up a lot of signals during the daily routine of feeding, removing dead and abnormal birds and adding extra litter. But make sure you also do some inspections without doing other things at the same time. Then you will be more aware of the signals because you are giving observation your full attention. If you are doing other things at the same time you will disrupt the birds' behaviour, causing relevant signals to be lost. The birds will also react less to your presence if you come into the house more often without doing anything specific. An inspection is a tour of the whole house. Make sure you pay attention to all the birds and all areas of the house. So look everywhere: front, back and middle. Stay calm and take your time!

## Look from flock to chicken

Start your inspection by observing the whole flock. How are they spread out in the space? Are they avoiding certain places, maybe because the climate is different there (draught, cold, light)? Try to spot the differences between birds. Are they uniform? How do they differ? Is it in alertness, condition or in another way? Pick up birds that seem different and take a closer look. If you discover an irregularity, see whether it is an incidental case or a signal of a bigger underlying problem. Also pick up some birds at random and assess them. Not all abnormalities are immediately obvious. Things you observe in detail can only be properly assessed in their context. So look from chicken to flock as well. Sometimes you will need to take a step back to be able to see things better.



Check the flock through the window. This way you can observe the flock unnoticed without disturbing the birds.



Before you enter the house and chase the birds around, observe how they are spread out in the house. There is clearly a problem here. The birds are lying together in groups because they are cold.



By hitting a bucket at the beginning of your inspection, you can assess the chicks' reaction and immediately select the ones that do not respond.



Put a chair in the house and sit on it for a few minutes at regular intervals to observe the birds. Only then will you pick up on any irregular behaviour.





## Using the signals

Use what you see to improve your flock management. Ask the following questions about everything you see:

1. **What am I seeing, hearing, smelling, or feeling? What is the signal?**
2. **Why is this happening? What is the explanation?**
3. **What should I do? Can I leave it or should I take action?**

If you think of things to do, do them. Otherwise there is no point in looking for the signals. And then assess whether your actions have had the desired effect. Take small steps. Pay attention to the reactions to small adjustments.

A genuine signal will be repeated. Think about what you are seeing and how it relates to the circumstances: does it happen often, at different times, to different birds, on other farms? Go and see for yourself or ask people.

Know when risks are likely to occur and keep one step ahead by eliminating them or being extra alert if you are expecting them.

### Vulnerable birds

There will always be some vulnerable birds in a flock, such as poorly developed ones. They will be the first to suffer from disease, lack of water or other shortcomings. These are also the signal

birds: the first ones to tell you that something is wrong; all the more reason to be aware of them. Think about which birds and problems these are, in terms of your particular farm and how you can respond to them promptly.

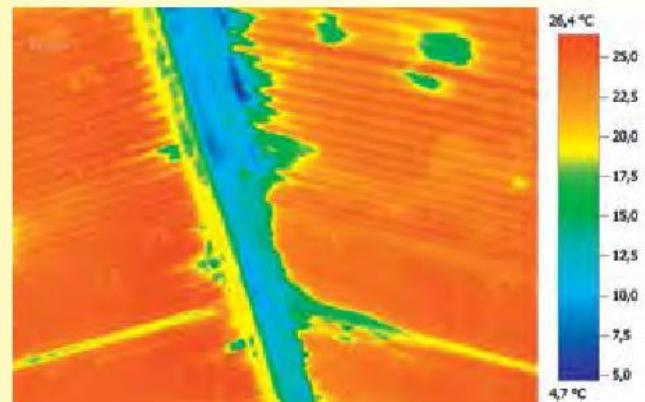
Some birds will also pose a risk to others, e.g. as a source of infection.



*This is a high risk bird. It may give rise to problems. Not so much as a victim but as the cause.*

### Signs humans can't see

Aids such as an infrared camera show what the human eye can't see. The roof of this house has not been properly insulated. Result: it cools down and condensation forms, possibly dripping on the floor.







## Farm blindness

You can only recognise an irregularity if you know what is normal. You will learn what is normal by observing as often and as objectively as possible. But be aware of the dangers of farm blindness.

Farm blindness is when you see the situation on your own farm as the norm. Limit farm blindness by talking to colleagues and advisors. Act on critical comments. Also go and look at other poultry keepers' operations.

Tip: join a study group. If there isn't one near you, set one up yourself. That way you will be able to share opinions and ideas with other poultry keepers.

### How to observe your birds in a structured way:

1. Look at them both with and without doing other things.
2. Look at the whole flock, the individual chicken and then back to the flock.
3. Look for averages and extremes.
4. Look at the front, back and middle of the house. The same applies to processes such as feeding. Look at the front, middle and back of the feeding system that is being filled. What is happening there?
5. Look at different times and in different circumstances.
6. At regular intervals, stand still in the broiler house and also get down and move about at the level the birds live at.
7. Identify critical times, susceptible birds and danger zones and keep an extra eye on them.



Limit farm blindness by talking to colleagues and advisors.

## LOOK-THINK-ACT



### What do these chicks tell you?

The chicks are creeping up to the wall and pecking at it. This is often a sign of anxiety or stress. Broilers are flight animals and seek protection when there is an unexpected visit. If the birds are pecking calmly at the wall, this may be an indication of a problem with the feed.



When you walk through the house, look at the birds that don't run away quickly from under your feet. These are signal birds that can tell you things. The birds that run away first are the stronger birds. The track you leave behind you will close again. Whether this happens fast, slowly or not at all is also a signal of the birds' vitality.





### Danger zones

In every broiler house there are areas where you can expect problems. Places you know could pose a risk should be a permanent part of your daily inspections. Make improvements to places that pose unnecessary risks. Examples of such places are corners, draughty areas, under the drinkers and feeders, and so on.

### Critical times

There are certain times of the day, season or certain times during an inspection that can be risky. Feeding time is an example: are the feeders and the weigh scale working properly?

But critical times can also be longer periods of time. Winter is a critical time as it is more difficult

to keep the house climate and the litter in optimal condition at that time of year, and moisture is harder to remove. In the summer, heat stress lies in wait.

### Unclassified notable observations

Sometimes you encounter things you don't immediately understand. Of course not every unclear signal will necessarily cause harm. A term for this is unclassified notable observations (UNO, 'you know'). When you see such observations, you need to find out why they occur. You will learn most by trying to understand how good situations come about: in other words, what the success factors are.

#### This is what you see



An indirect signal is encrusted or compacted manure. This indicates...

#### Caused by



...a poor distribution of birds in the house, which may be caused by...

#### Actual cause



... a cold draught, which makes birds avoid cold places in the house.

### Risk analysis and action

Susceptible group	Risk	Action
Poorly developed birds	Less uniform flock	Remove small birds
Birds with vent pasting	Inadequate feed usage, wet litter	Determine and eliminate or treat cause of intestinal dysfunction
Slow or limping birds	Severe motor disorder with weight gain	Check bone development and look for joint inflammation Check feed composition and adjust if necessary



## Senses

**Most of a chicken's senses work differently from those of humans. Its eyesight is much better, for example, but its hearing possibly less so.**

### Eyes – sight

Chickens can see many more details and more colours and make more observations per second than we can, such as fluorescent lights (50 Hz) flickering. Chickens can see ultraviolet light and are more sensitive to other colours than we are. What we experience as white light can be light blue or red to a chicken, depending on the light source.

### Nose – smell

Chickens have a good sense of smell but not as sensitive as that of mammals. Chickens use their noses to search for food and to recognise others of their species. Not only can they smell high concentrations of substances such as ammonia, they also have special nerves which make it painful to do so.

### Beak – touch

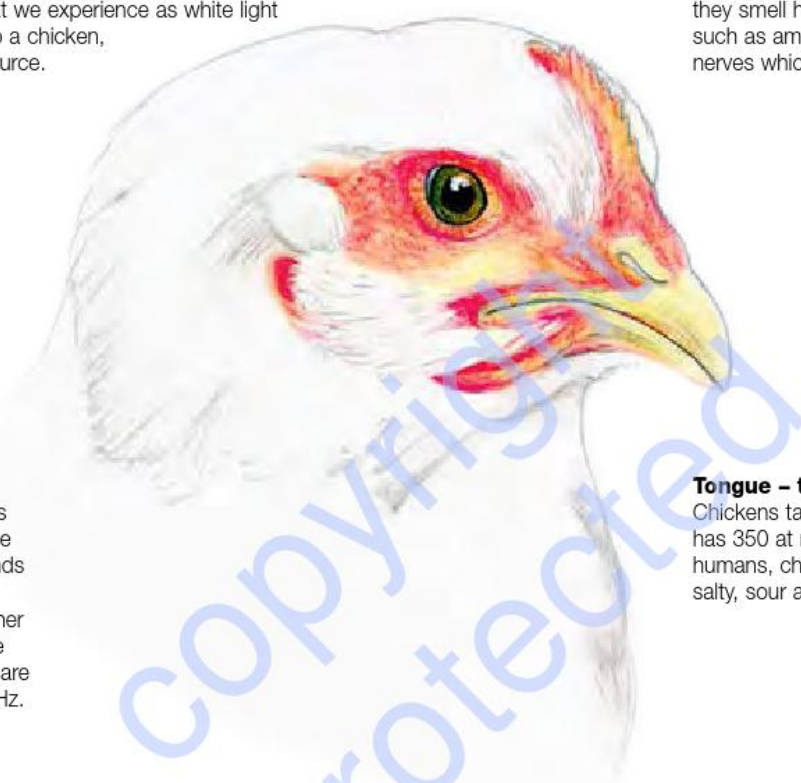
Chickens can distinguish several contrasts with their beaks: hard/soft, hot/cold, structural differences (rough/smooth) and pain. The tip is the most sensitive part of the beak.

### Ears – hearing

Chickens perceive sounds from 15 to 10,000 Hz. The human ear can hear sounds up to 20,000 Hz and can therefore hear slightly higher tones than a chicken. The sounds a chicken makes are between 400 and 6,000 Hz.

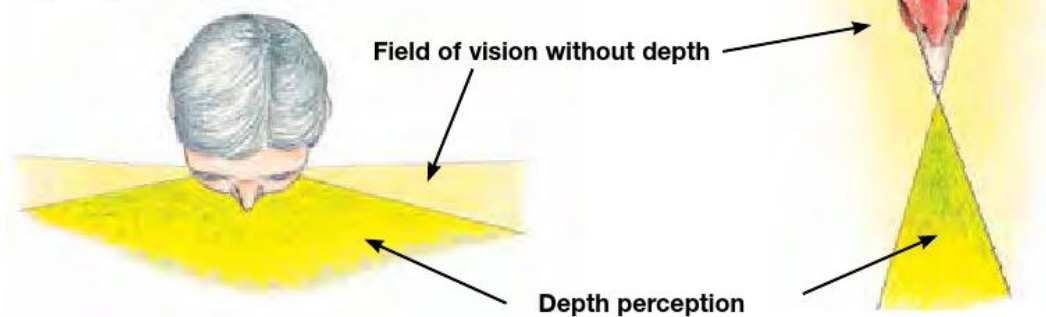
### Tongue – taste

Chickens taste with taste buds. A chicken has 350 at most, a human 9,000. Like humans, chickens can distinguish sweet, salty, sour and bitter.



### Field of vision

Chickens have panoramic vision of about 300°, but the overlap between the two eyes is minimal. They can only see depth in a narrow angle (shown in dark yellow). When you go into a broiler house, you may sometimes see all the chickens briefly shaking their heads at the same time. This enables them to see what is happening better (with depth).







## Anatomy

When you talk to your advisor or vet, try to use the correct terminology to avoid confusion. To be able to observe irregularities, you first need to be able to recognise a normal bird.

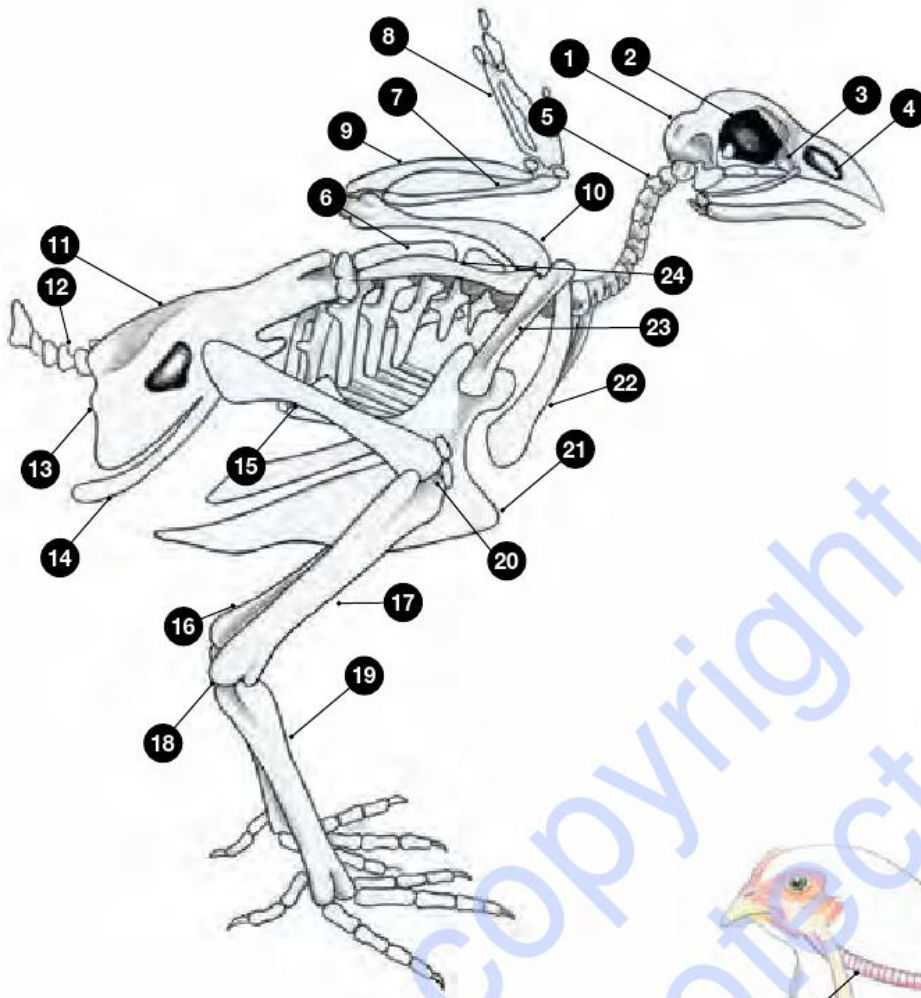
- |    |          |    |             |
|----|----------|----|-------------|
| 1  | beak     | 11 | breast      |
| 2  | nostrils | 12 | wing        |
| 3  | comb     | 13 | preen gland |
| 4  | ear      | 14 | tail        |
| 5  | earlobe  | 15 | vent        |
| 6  | wattles  | 16 | belly       |
| 7  | crop     | 17 | shank       |
| 8  | neck     | 18 | footpad     |
| 9  | back     | 19 | toe         |
| 10 | shoulder | 20 | hock        |



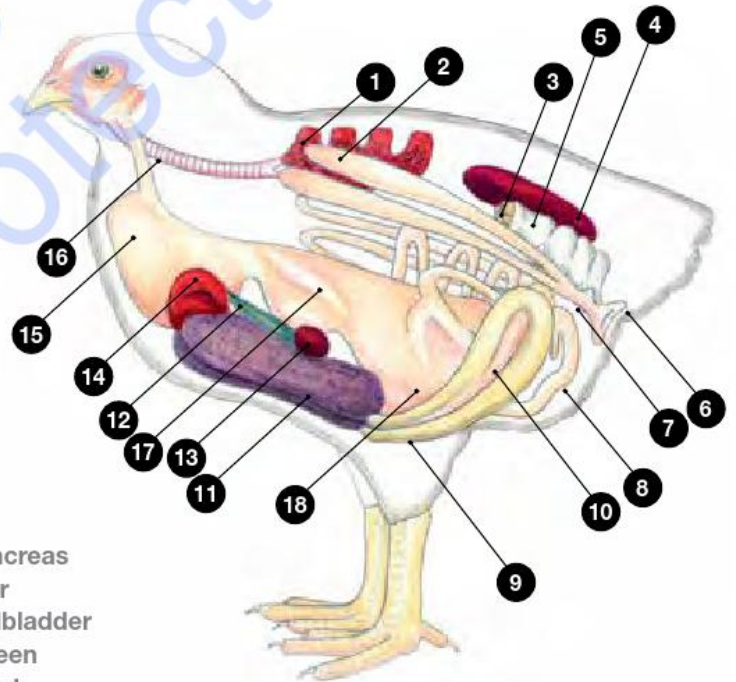




### Skeleton



- |                      |               |
|----------------------|---------------|
| 1 cranium            | 13 ischium    |
| 2 eye socket         | 14 pubis      |
| 3 nasal cavity       | 15 femur      |
| 4 nostrils           | 16 fibula     |
| 5 cervical vertebrae | 17 tibia      |
| 6 thoracic vertebrae | 18 hock joint |
| 7 radius             | 19 metatarsus |
| 8 metacarpus         | 20 Knee joint |
| 9 ulna               | 21 Sternum    |
| 10 humerus           | 22 Clavicle   |
| 11 pelvis            | 23 Coracoid   |
| 12 tailbone          | 24 Scapula    |



### Organs

- |                   |                   |
|-------------------|-------------------|
| 1 lungs           | 10 pancreas       |
| 2 caecum          | 11 liver          |
| 3 ovary           | 12 gallbladder    |
| 4 kidneys         | 13 spleen         |
| 5 oviduct         | 14 heart          |
| 6 vent            | 15 crop           |
| 7 rectum          | 16 trachea        |
| 8 small intestine | 17 proventriculus |
| 9 duodenum        | 18 gizzard        |



### Feed structure: intake and digestion

Structure of the feed stimulates the development of good digestion. A lack of structure because of too finely ground mash slows down intestinal peristalsis so the feed is less thoroughly mixed with the intestinal juices. That's why it's important to grind the feed down relatively coarsely (i.e. not too finely).

Adding whole grain wheat promotes stomach and gut development. When ground coarsely enough, mash feed also stimulates the intestines, but pellets are more easily digested by the birds.

Too finely ground mash feed can be pelleted, so that birds can still digest it, but it does not stimulate the intestines enough.

#### In what form do you provide the feed



Pellets are preferable to mash for a higher, more balanced feed intake (top). The particles have to be of good quality so they don't turn into powder before the bird can eat them.

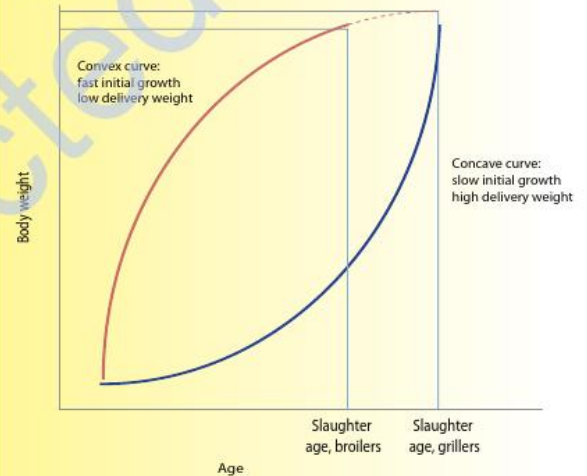
In the bird's crop, the particles should fall apart and turn into mash that passes into the stomach and the intestines. If the pellet size varies too much you run the risk of selective feeding: the broilers pick the pellets they prefer out of the feed (the bigger ones). Pellet size does not tell you anything about the coarseness of the feed. That depends on how coarsely or finely it is ground.

### Controlling the growth curve

Feeding programmes depend on what the abattoir (processing plant) wants. Does it sell birds whole or are they cut up?

Broilers being raised for a high end weight need to have their growth slowed down slightly just after the first week. The first three weeks are mainly about the formation of the organs and the skeleton; immediately after that you start the sprint towards a high weight. (concave curve) If you don't do this, you will get a lot of foot problems, sudden death syndrome and metabolic problems such as ascites resulting in higher losses. These birds will also be less active.

Skeleton formation is less of a limiting factor in birds that are slaughtered lighter, so you can allow these birds to grow as rapidly as possible (a convex curve). This way you get the birds to slaughter weight earlier and you can raise more crops/cycles per year.



Adjust the growth curves according to the end weight you are aiming for. This can be done with lighting programmes and by adjusting the feed composition and the feeding regime.

### Keep samples of feed

Keep a sample from every feed delivery. If there are problems you can investigate whether the feed is the cause (e.g. toxic substances). Store the samples in sealable plastic pots or zip-lock bags and keep them in a cool, dark place until after slaughter.





## Phase feeding

The need for nutrients changes during the growth period. Broilers at different phases of life therefore need different feeds. The more transitions there are, the easier it is to match the feed to the birds' needs. Be aware that changes in the feed composition can disturb the gut flora and upset the birds. In addition, the flavour of the feed also changes, which in turn can affect feed intake. The transition between two different feeds must be gradual so as to minimise the stress on the gastrointestinal system and avoid digestive problems.



The feed separates so the feed composition the broilers get is less uniform, increasing the risk of gut problems.

## Feed strategy

A broiler's needs change during its life: the need for protein drops and the need for energy increases. This also occurs in the wild. Young birds are mainly fed worms (protein) and gradually learn how to eat grain (energy). To meet these changing requirements, poultry farmers often work with three or four types of feed.

### Starter feed (0-10 days)

- Crumb or mini-pellet (better feed intake and end weight)
- Optimal development of organs, bones and muscles
- High in protein, vitamins and minerals for maximum growth during this very critical period
- Add very little or no wheat
- Expensive

### Grower feed (11-22 days)

- Crumb (2-3.5 mm diameter)
- Gradually decrease protein content and increase energy
- Feed structure aimed at maximum intake
- Start wheat addition at maximum 10%

### Finisher feed (23-end)

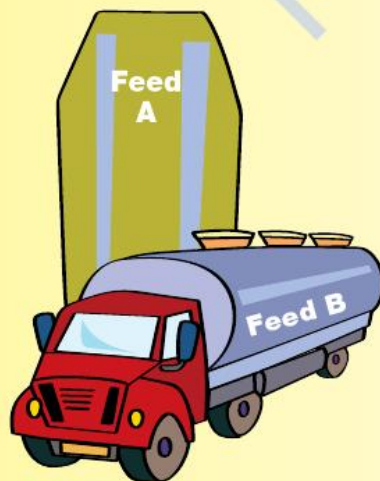
- Crumb or pellet (3.5 mm diameter)
- Continue to reduce protein and increase energy
- Maximum wheat addition from 50 to 55%
- Metabolic conversion of protein to fat results in poorer feed conversion, so it is important to give enough energy in this phase
- Highest feed costs due to high intake during this period

### Non Medicated Finisher feed

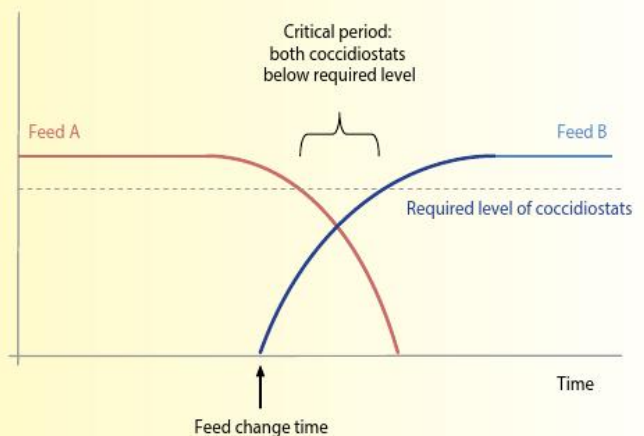
- Feed without medicines or anticoccidials must be given at the end right up to slaughter. Some anticoccidials have a withdrawal time of 0 days so they may be used in Non Medicated Finisher feed.

## Critical time: feed transition and coccidiostats

Be careful when using coccidiostats; if the different feeds contain different coccidiostats, the dose of both anticoccidials may be too low at the feed transition. This puts the birds at a higher risk of gut damage from coccidiosis, with all the inherent problems.



Level of coccidiostats







## What the figures tell you

Broilers are kept in large numbers. Therefore, problems that start small are often noticed (too) late.

Often the birds' behaviour will not indicate possible problems such as whether they are eating too little. But minor changes may be a precursor to e.g. severe gut problems. By recording and evaluating objective house data daily you can intervene much earlier and avoid problems or expensive treatments.

## Where and how?

Make it easier to spot changes by always recording the data at the same time every day. Generally a marked change in feed or water consumption is the first sign that there is a health, feed, ventilation

or temperature problem. Make sure that it is easy to record data at the location where you make the observations i.e. hang a card on the door, keep a water list at the water meter, etc. Or alternatively, use a centralised (digital) form that is filled out during inspection rounds.

## Set your own standards

Compare your data with the standards recommended by the breeding organisation. But it's actually more important that you also set your own standards and to, for example, compare figures and data with previous flocks. Compare your practices with those of nearby farms who keep the birds in a similar manner.

### Data Collection Chart Broiler

Starting date : ..... Breed : .....  
 House number : ..... Hatchery : .....  
 Number of broilers : ..... Breeder farm : .....  
 Age of mother hens : .....

Date	Age	Mortality			House temperature			Weight		Feed intake				Water intake			Comments				
		Per day	Total	Number perch	Ambient	Minimum	Maximum	Standard value	Actual	Feed	Standard value per day	Actual per day	Water	Standard value per day	Actual per day	Water					
0					20.0			40													
1	20				20.0			40													CO <sub>2</sub> max. 2300 ppm
2	19				20.0			40													
3	18				20.0			40													
4	17				20.0			40													
5	16				20.0			40													
6	15				20.0			40													
7	14				20.0			40													
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Broiler weight scales. Check all weighing equipment regularly to make sure it is working properly. Not only is faulty data worthless, it also gives you incorrect signals, which is much more serious.



Record the data where you collect it to prevent loss of information. In this case: in the poultry house.

Good management: note down the house data on the flock chart and check the house computer every day. Evaluate this data every day. Also make comparisons with previous flocks.

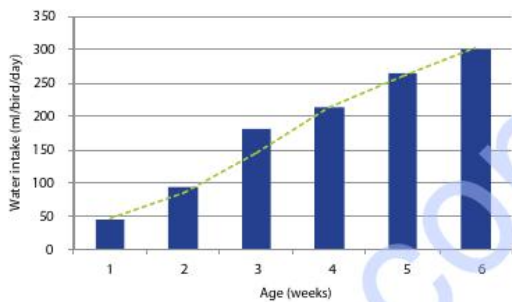
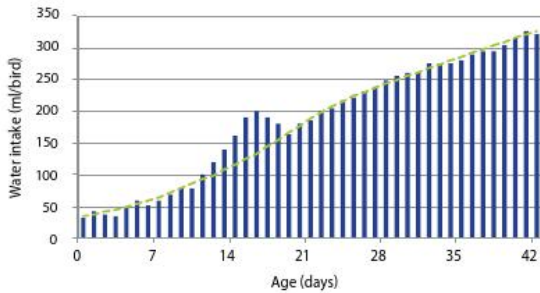




## Frequency

The value of data depends on how often you collect it. Daily recording of data gives you more information than if you do it on a weekly basis. Especially given that the production cycle of broilers is so short and therefore, the window of opportunity for intervention is limited, it is important to promptly respond to subtle signals. Especially water and feed intake are critical.

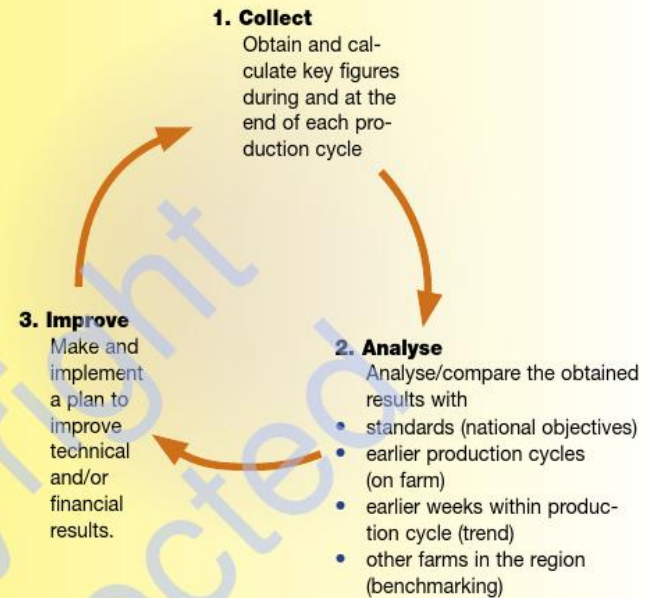
## Difference between daily and weekly recording



In the graph above (top), the daily water intake is recorded, and you can see the fluctuations that may be indicators of heat stress, disease, vaccination reaction, etc. If you only record this weekly, these details would go unnoticed since only the average over a 7-day period is recorded. Also, you will always have to account for a delay – the problem may start on the first day of the week but you will only discover it a week later (too late).

## Do something with the data: management cycle

Merely recording data is pointless and demotivating if it is not used. Make sure you regularly consult the data in order to constantly improve your results. The management cycle of data collection, analysis and implementation of improvements must be a continuous process.



## Refined data tells you more!

The more you refine your data, the more useful it will be to you.

For example: water intake

**Water meter: shows an absolute value for that moment in time.**

- This doesn't tell you anything; it only shows you how much water has been used since the meter was installed.

**Water consumption: difference water meter readings between yesterday and today**

- Gives a picture of water consumption, but it remains a number that cannot be associated with a standard value.

**Water intake per bird**

- This can be associated with a standard value for that age

**Water intake per bird, over time**

- Shows the development of water intake (rising slope, but to what extent?)

**Water intake per bird over time, associated with a standard value**

- Gives a complete picture of the real-time situation, development and what is standard. Deviations are best seen in a graph (e.g. on graph paper or on computer software).



## Main parameters

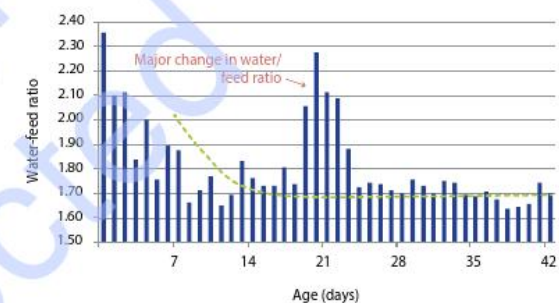
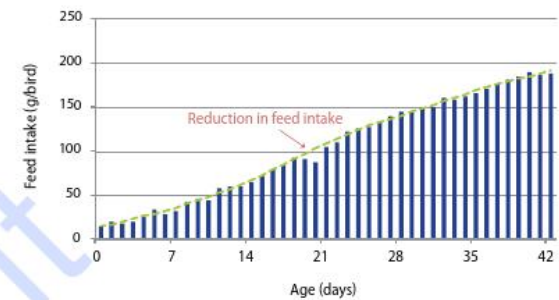
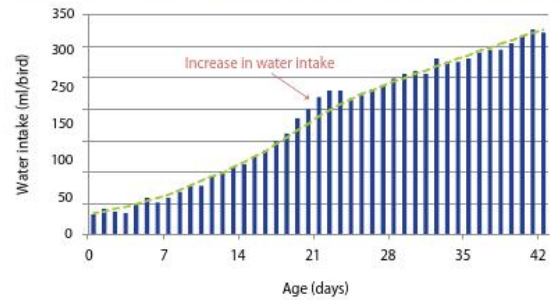
### Water and feed intake

Healthy chicks drink a little bit more water each day. Record the water intake on a daily basis so you can effectively search for a cause in case of abnormalities. Increased water use may be caused by high temperatures, elevated mineral levels in the feed or, don't forget, leaking pipes. A reduction in water supply may also occur. In such a case, make sure to monitor the clarity/cleanliness and taste of the water and also the water pressure in the pipes. A healthy chick has a good appetite. Feed intake per chick must increase daily. In the event of declining feed intake, check the birds for the presence of disorders and confirm the availability and the quality of the feed.

### Water-feed ratio

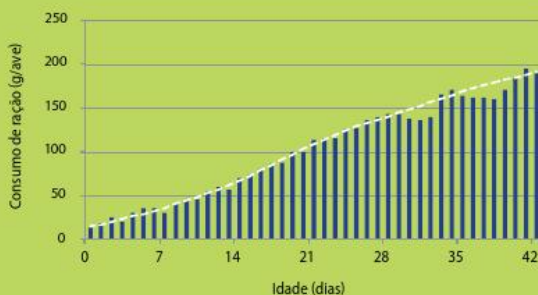
The water-to-feed ratio drops as the birds grow older. A rise in water intake is often accompanied by a reduced feed intake. With such a strongly skewed ratio, it is immediately clear that a problem exists, e.g. an intestinal problem. In the event of deviations, not only monitor the birds themselves but also the feed and water supply system and the quality of the water and feed. Realise, though, that the water-to-feed ratio increases significantly at high ambient temperatures, which therefore would not indicate a problem.

## Water-feed ratio sheds light on problems



*A typical case of vaccination reaction: the birds vitality is affected by the vaccination. This starts about 5 days after the vaccination and persists for a few days. Feed intake drops slightly while water intake rises slightly. This is reflected in the graphs for water and feed intake. But the effect is clearest if you calculate the water/feed ratio and then compare it to the standard!*

## LOOK-THINK-ACT



### What could this mean?

Two points can clearly be seen in the feed intake where the feed intake levels off, or even drops. In this case the poultry farmer started with a high bird density and loaded them at two different times, on day 32 and day 38. Overcrowding just before delivery hindered the chicks' access to the feed tray or caused there to be too little feeding space. Upon observing deviations, look for a cause. But the cause does not necessarily always lie with the chicks. For example: increased water consumption may indicate heat stress or disease or, alternatively, it may just as well be a leaky pipe. Always look beyond the obvious; if the birds appear healthy and feed consumption levels are normal, the problem may lie with the water supply.





## Growth

A healthy chick gains weight every day. Growth retardation could be a sign that the birds have consumed less feed, that the feed is nutritionally deficient or that they are not allocating their energy to growth but instead, for instance, to resistance, stress/heat stress or physical activity. The need to combat an infection can easily increase a chick's energy needs by some 25%. The chick's growth is then suspended. Weigh the animals at set times in order to monitor the average growth in a flock and record the weight along a timeline. Absolute weight is less likely to provide useful data. Weight increases per unit of time provides a quicker picture of abnormalities.

**Growth:** 
$$\frac{\text{weight day } Y - \text{weight day } X}{\text{number of days}}$$

## Mortality

Remove dead birds daily. Count them and be alert if the death rate is slightly higher than in previous days. For a regular flock, the sum of the number of deceased chicks in week 1 and week 6 is higher or equal to half of the total death count during the whole cycle. For example: The total death count in a cycle is 4%; then the death rate in the first and last week is typically 2% or slightly higher. Strive for a total death rate below 1% in the first week and 0.06% per day, 0.1% per day and 3.5% for the entire cycle is still acceptable.

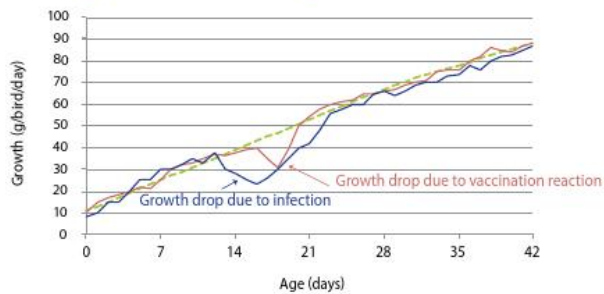
**Mortality (%):** 
$$\frac{\text{number of dead birds}}{\text{number of day-old chicks}} \times 100$$

## Feed Conversion Ratio (FCR)

Feed conversion ratio is a measure of how efficiently the chicks use the feed for growth. The lower this value, the more efficient the conversion. Take relevant results from other countries with a grain of salt, since feed compositions and climatic conditions are different there. Only compare your data to those of farms in your region and that use the same feed.

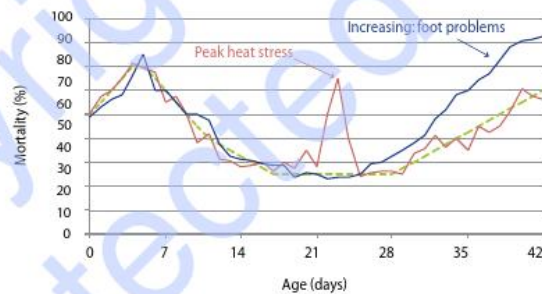
**Feed Conversion Ratio:** 
$$\frac{\text{feed intake}}{\text{weight gain}}$$

## Recognise cause of growth retardation



Disease can be a cause of growth retardation, which includes vaccination reactions and mild infections from "wild" strains of pathogens. But they give varying pictures: vaccination reaction can be observed throughout the entire broiler house at any given moment. But a mild infection spreads more slowly through the flock, causing average growth to drop at a slower rate and subsequently prolonging recovery: the first chicks recover while in other locations in the house chicks are becoming ill. Analysing weight data could even show how an infection (e.g. bacterial) is spreading through the broiler house.

## Recognise cause of mortality



Patterns in mortality may also serve as indicators. Heat stress, for example, results in peak mortality numbers, which subsequently declines once the heat has passed. Leg/paw problems result in a more gradually ascending slope that is consistent until the end of the cycle.

## Indexes

FCR 2000 (feed conversion ratio calculated for a 2-kg chick) and EPEF (European Poultry Efficiency Factor) are commonly used as comparative indexes. The feed conversion ratio says something about production efficiency. A production value like EPEF says more about general management aspects since it also takes mortality and growth rate into account. Instead of growth per bird per day, for the sake of simplicity, often body weight (kg) divided by slaughter age (days) is used.

**EPEF:** 
$$\frac{(100 - \text{mortality}) \times \text{average growth per bird per day in kg}}{\text{FCR}} \times 100$$

Corrected Feed Conversion Ratio for comparisons:  
**FCR 2000:** 
$$\text{FCR} - (\text{slaughter weight} - 2000) \times 0.33/1000$$

# Poultry SIGNALS®

## BROILER- SIGNALS

A practical  
guide for  
broiler focused  
management

**'Keeping broilers is like a Formula1 race:  
there's no time for mistakes.'**

Broilers are fast growing animals that need constant care. There is no time for correcting mistakes. And when something goes wrong, it often leads to high costs. Therefore, it is essential to prevent mistakes. Your birds continuously send out signals: about their health, how well they know their way around their surroundings and whether they feel happy and comfortable. Proper management starts with recognising those signals in practice.

Do you recognise the signals your birds are giving? For the poultry farmer this means being alert in the broiler house, observing and listening to the birds. Observe individual birds and the flock.

And do you know what to do when the chicks are spilling too much feed, or have dirty feathers? Do you know the difference between abnormal, runny droppings and healthy caecal droppings? And how do you recognise hungry chicks when the flock has just been set up?



The book *Broiler Signals* follows the cycle on a broiler farm. Every stage is discussed and important aspects are highlighted.

This broiler focused management will improve the production and welfare of the broilers and thus the economic results of the poultry farmer.

*Broiler Signals*® is a practical guide that shows you how to pick up the signals given by your animals at an early stage, how to interpret them and which action to take.

*Vleeskuikensignalen* is onderdeel van *Kipsignalen*®.  
*Broiler Signals*® presents practical knowledge of animal oriented poultry farming in an easy, accessible format.





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