

# DLG Test Report 6238 F

PAL Bullermann GmbH

## PAL-VITAL feeding bowl for broilers

Handling, cleaning and feed dosing



**DLG** FOKUS  
TEST

10/14

Handling, cleaning  
and feed dosing



Test Center  
Technology and Farm Inputs

[www.DLG-Test.de](http://www.DLG-Test.de)

# Overview

The FokusTest is a small-scale DLG usability test intended to allow product differentiation and special highlighting of innovations in machinery and technical products used primarily in agriculture, forestry, horticulture, fruit cultivation and viticulture, as well as in landscape and municipal management.

This test focuses on testing a product's individual qualitative criteria, e.g. fatigue strength, performance, or quality of work.

The scope of testing can include criteria from the testing framework of a DLG SignumTest, the DLG's extensive usability test for technical products, and concludes with the publishing of a test report and the awarding of a test mark.



The DLG FokusTest "Handling, cleaning and feed dosing" includes repeated investigations at a real-life farm at different times

during the fattening period and also examines both the assembly of the bowls and the time needed for cleaning.

The testing was based on the DLG testing framework for poultry feeding bowls, in the version of 1.2/2014.

Other criteria were not investigated.

## Assessment – Brief Summary

This DLG FokusTest investigated the handling, cleaning properties and quality of feed dosing of the tested PALVITAL feeding bowl for

broiler farming. In a practical test, the feeding bowl fulfilled the requirements excellently with respect to the tested criteria.

Table 1:  
Overview of results

Tested characteristic	Test result	Evaluation*
<b>Handling</b>		+ +
Bowl assembly	very easy, approx. 30 s per bowl	
Handling	easy the plates can be opened with one hand (snap lock/hinge)	
Operating instructions	detailed and easy to understand	
<b>Cleaning</b>		+ +
Hygienic design	bracket with few critical edges cleaning-friendly surfaces	
Ease of cleaning	easily accessible plate can remain attached to bowl during cleaning	
<b>Feed dosing</b>		+ +
Feed dosing	small quantities in the bowl excellent automatic refilling behaviour no blockages	
Feed losses	very low	
Feed quality and contamination	good design for preventing the introduction of contamination reduced incentive to scratch fresh feed thanks to low fill level	

\* Evaluation range: + + / + / o / - / - - (o = standard, N/E = not evaluated)

# The Product

## Manufacturer and Applicant

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Product:  
PAL-VITAL feeding bowl  
for broilers

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## Description and Technical Data

The PAL-Vital feeding bowl is a feeding bowl for use in broiler fattening. It is also used for the rearing of turkeys and ducks, i.e. for poultry with a live weight of up to 3 kg.

According to the manufacturer's information, it was developed

with smooth surfaces and a small number of corners and components in accordance with hygiene aspects. The feeding bowl features PAL's hygiene cone, which is intended to ensure that chicks stay out of the bowl and therefore improves the quality of the feed. The bowl is fitted with an automatic minimum controller, so that feed is refilled automatically. The self-dosing

function is intended to constantly mix fresh feed into the old feed and thus to achieve a high feed quality.

Furthermore, the bowl features patented one-handed operation (Patent DE 10 2010 029 950 B4), which is intended to reduce wrist strain and improve working efficiency.

All of the bowl's parts are manufactured in Germany.

Table 2:  
Technical properties (according to manufacturer's information):

PAL-VITAL feeding bowl for broilers	
Material	Polypropylene
Weight	965 g
Bowl diameter	40.0 cm
Overall height	31.0 cm
Height beneath the pipe	23.5 cm



Figure 2:  
Structure of the PAL-VITAL feeding bowl

# The Method

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The test criteria were investigated in a practical test at a broiler farm. Testing took place at a real-life farm in Hesse at various phases of a fattening period. The broiler house, which was designed with places for 39,900 birds, housed 37,000 broilers per fattening run during the trial period. There was a total of 344 feeding bowls on the four feeding lines, each with two parallel drinker lines. Based on these figures, each feeding bowl supplied 107 birds at the start of fattening. In the first few days, feeding additionally took place on paper tracks. The fattening period lasted 42 days, with some birds being removed early. The birds were fed pelleted broiler fattening feed with an ad libitum proportion of grain that was produced on the same farm. The distance from the feeding line to the floor was adjusted manually by the bird keeper approximately once a week depending on bird's growth.

Several feeding bowls of the tested type were installed. In addition to these, four different feeding bowl types from other manufacturers were mounted along the feeding line at the same time to allow direct comparison.

## Handling

The handling is evaluated according to several subcriteria. All phases were evaluated, from assembly to use in feeding and finally through to cleaning.

The bowls were assembled by a company representative. Evaluation criteria included the time taken, the use of necessary aids and the simplicity of installation. The operating instructions were also examined.

The handling of the bowls for the bird keepers was assessed and also examined by the tester at each visit. At the same time, the two bird keepers themselves were asked for their assessment of the bowls when operating them during the trial period. This also included questions on all relevant points, such as accessibility for birds and people, feed quality, feed contamination, feed dosing, hygiene, maintenance requirements, and whether they would install the bowls again.

Technology must not result in injuries to the birds. For this reason, assessments of the plumage were carried out in the form of spot checks at several points of time during fattening. Furthermore, direct observations were also carried out as spot checks to investigate whether the birds were able to reach the feed or whether problems were obviously occurring with regard to feed intake.

## Cleaning

Good feed hygiene also relies on the feeding bowls being easy to clean. It must be possible to clean the bowls completely in a simple and labour-saving manner. Therefore, the bowls' hygiene design

was evaluated: material selection, hygienic design and potentially inaccessible geometry. During practical use, an evaluation of cleaning was performed by the tester, the bird keeper and a professional cleaning firm. The main criteria were accessibility, cleaning quality and comfort.

## Feed dosing

The available quantities of feed in all bowls were weighed. Since the bowls are filled automatically to a specified level for the purpose of ad lib feeding, besides the feed quantities in the bowls, the refilling features were examined. These investigations focussed on the speed of refilling and lack of blockages. This is closely connected to the feed losses, which were checked visually and evaluated by comparison with the other bowls. In addition to the bowls' design, the feed quality was assessed by examining the feed and the bowl itself for contamination. This was done by a direct comparison with the existing technology through visual assessment and laboratory examination of feed samples from the individual bowls with regard to the chemical feed parameters of dry matter and crude ash content, as well as the microbiological quality.

# The Test Results in Detail

## Handling

### Bowl assembly

Throughout Germany, the feeding system is assembled by the company's own fitters according to the manufacturers' instructions. In addition to installing the bowls, assembly also includes installing the feed lines and feed distribution units. This test only assessed the assembly of the feeding bowls themselves.

The feed bowls were changed from the matching 45 mm feed pipe without problems within approximately one minute per bowl, having spent more than half of the measured time dismantling the old bowl. Attaching the new bowl took between 20 and 30 seconds. The only tool needed was a light rubber mallet for pushing together the head piece and the feed cone part where this was not possible with bare hands.

Assembly could therefore be carried out very easily by one person in a short time without further aids. The operating instructions were very clear and easy to understand, offering numerous images of the individual steps.

### Evaluation of "Handling"

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Easily accessible, very simple one-handed operation

### Handling

The bowl was well-manufactured and exhibited no sharp edges or manufacturing marks. There was no apparent risk of injury to either birds or humans. No technology-related damage was observed on the birds or their plumage during the assessments carried out as spot checks. The bowl's cone is narrow enough to allow sufficient food to trickle out, but to stop small chicks becoming wedged in the cone. There were no incidents of birds becoming caught in or on the bowl during the investigation period.

The bowl is readily accessible and very easy to operate. No maintenance work was required during fattening. It was only necessary to adjust the height in line with the birds' development. This, however, is an aspect of the overall feeding system and not of the bowl itself.

The patented one-handed operation is particularly worthy of note: the bowls could be emptied very quickly and easily in preparation for cleaning. The feeding plate is removed from the bracket at one side with one hand – and the plate folds down. A knock on the feed pipe causes the plate to empty immediately. A hinge on the other side of the bowl means the plate does not need to be removed com-

pletely, opposite to the reference bowls. This design simplifies and speeds up the step of emptying remaining feed from the bowls. In addition, the bowl remains intact and the individual plates do not need to be stowed and cleaned separately. With an average of 300 to 400 bowls per broiler house, the time saving effect varies depending on the reference technology.

The birds accepted the PAL-Vital feeding bowls without problems. The relatively low rim has a positive effect on eating comfort, especially of the youngest chicks. One key factor for achieving an optimum eating height in the course of fattening is the adjustment of the feeding lines, which must be adjusted and readjusted manually by the bird keeper. Achieving an optimised setting is therefore also a question of good bird observation and good management. At the end of fattening, the birds use the feeding bowls in both – lying and standing. The proportion of lying and standing birds was very variable. The birds generally did not change bowls during a "meal". Hardly any displacement or other aggressive behaviour occurred at the feeding bowls. No differences could be identified between the bowl types during the direct observations carried out as spot checks.



Figures 3 and 4:  
One-handed operation

## Cleaning

The following cleaning process was performed at the trial farm:

- Empty the broiler house: catch the birds
- Let the feed and water lines run empty
- Empty remaining feed from the bowls
- Raise the bowls along with the lines
- Muck out
- Soak for approx. 24 hours with water from the municipal supply using a fixed spray system
- With a professional barn-cleaning service provider:
  - Foam the surfaces with an alkaline detergent
  - Rinse with a high pressure cleaner
  - Disinfect by fumigating with formalin
- Leave the barn empty for a few days before introducing the next set of birds

Compared with the conventional types of bowl, the patented one-handed operation, as described under “Handling”, was well received during preparation for cleaning. Furthermore, during the subsequent cleaning, the bowls’ design has the advantage that the feed plates do not need to be washed individually, but can rather be cleaned directly, together with the whole bowl, using the high pressure cleaner without being blown through the barn by the high pressure of the water jet.

Both the farmer and the professional barn cleaner praised and highlighted the good cleaning quality, as well as the accessibility due to the small number of parts.

### Hygienic design

Polypropylene is a typical plastic for this application, as it is always very durable and resistant to common cleaning agents and disinfectants. The smooth, round surfaces on the cone, feed plate and rim, with very few corners and edges, reduce the adhesion of dirt.

At the same time, geometries of this kind are easy to clean.

Particularly worthy of note is PAL’s new bracket for attaching the bowl to the feed pipe. The head piece completely surrounds the pipe and has only a small number of openings and cavities that could allow dirt to adhere between the pipe and the bowl mounting. As the feeding bowls are usually only washed, without being removed completely, the new design has considerably reduced the risk of dirt and germs.

### Evaluation of “Cleaning”

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Easy cleaning and hygiene thanks to hygienic design

## Feed dosing

The difference between the bowls’ fill levels became clear on removal of the birds from the housing and during preparation for cleaning: the fill level in the feed plate of the tested bowls was approximately 0.5 to max. 1 cm. The reference bowls were full almost to the brim, with a fill level of 5–7 cm. After an eating-up period of 8.5 hours, the feed remaining in the PAL-Vital bowls was between 13 and 29 g. In the reference bowls, the measured quantity was almost tenfold at over 200 g.

When the feed quantities were weighed on the 35th day of fattening, the quantities in the reference bowls were up to five times higher (see Table 3).

The excellent and very rapid refilling characteristics rule out any risk of the birds being provided with too little feed because of the automatic fill level. The replacement feed

trickles out of the space inside the cone very quickly. No clogging of the outlet gap or wedging of the pellets was observed at any point. The automatic fill controller worked perfectly during the trial period. Some birds pecked the feed directly at the outlet gap, even though there was sufficient fresh feed in the bowl. The birds themselves therefore also accelerate refilling.

The bowls are firmly attached to the feed pipe. As a result, the bowls mirror the slight oscillating movement of the feeding line. Part of the feed therefore trickles – the pellets faster than the flour – towards the lower side: this is usually the side at which the birds are currently eating. This effect is normal with this technology and did not seem to affect eating behaviour.

### Feed losses

The majority of feed losses usually occur with chicks. So that the small birds can reach the feed easily, the feeding line must be set to a very low height and the fill level must be set slightly higher. This results in a greater motivation for the chicks to climb into the bowl and scratch in the feed.

In direct comparison with the four other feed bowls, which were of very different types, the tested product exhibited the lowest level of feed loss. With some reference bowls, a light-coloured ring of feed even appeared in the litter around the bowls; this was clearly caused by the birds scratching in the bowl. Although the chicks were also observed scratching in the bowl tested here, this was significantly rarer. No ring of feed was observed around the bowl in the critical



Figures 5 and 6:  
Accessibility (left), detailed view (right)

phase between the 7th and 12th days either. From the mid-point of fattening onwards, the bowl's construction with the central cone makes it impossible for the birds to enter the bowl.

The following factors were essential to the reduction of feed losses compared to the other bowl types:

- The feeding surface is smaller because of the central cone, despite the feeding positions being of the same width.
- The fill level of feed is lower.
- The rim of the feed bowl is comparatively higher.

The design of the inlet cone in the middle of the bowl results in a smaller feeding surface, which offers less space and therefore less incentive to misuse the feeding bowl as a scratching area. The relatively low rim facilitated feed intake at the start of the fattening process. However, the lower fill height meant the rim still offered adequate protection against feed losses.

*Feed quality and contamination*

In terms of the visual evaluation, the reduced incentive and possibility for the chicks to enter the bowl and use it for scratching also had a positive effect on the introduction of contamination. They defecated more rarely into the feed and brought less litter into the bowl from outside. The cleanliness of the bowls was excellent. The raised rim also served well to prevent the introduction of contamination. The smaller amounts in the feeding bowl meant comparatively fresher food was always available to the birds, as described under "Feed dosing". The two bird keepers also confirmed this as a particularly positive effect and highlighted it during the interview.

However, it was not possible to substantiate the results obtained through visual evaluation with the indicative laboratory investigations, as these found no significant differences between the tested and reference bowls. With regard to dry matter and crude ash content, for example, there was no significant difference between the feed samples from the feed storage container, the individual tested bowls and the existing bowls. Differences were identified between the micro-

bial counts of the feeding bowl contents and the sample taken from the barn's feed storage container, which is located at the start of the feeding line. However, the indicative microbiological test found no differences between the new and existing feeding bowls. Visually, the differences were apparent to both the testers and the bird keepers.

<b>Evaluation of "Feed dosing"</b>	++
Excellent refilling characteristics, low fill heights, fresh feed	

Table 3: Amounts of feed in the bowls

Bowl	35th fattening day during fattening Amount [g]		Removal from housing after 8.5 h of eating-up time Amount [g]	
	PAL-Vital	Reference bowls	PAL-Vital	Reference bowls
1	81	512	14	17
2	114	305	20	211
3	153	146	21	132
4	167	80	29	174
5	180	387	15	-
<b>Mean</b>	139	286	20	134
<b>Minimum</b>	81	80	14	17
<b>Maximum</b>	180	512	29	211



Figure 7: Refilling effect after removal of feed

## Summary

This DLG FokusTest investigated the handling, cleaning properties and feed dosing of the tested PAL-VITAL feeding bowl for broiler fattening.

In a practical test, the feeding bowl fulfilled the requirements excellently with respect to the tested criteria.

## Further Information

Further test results on stable equipment are available to download at: [www.dlg.org/fuetterung.html](http://www.dlg.org/fuetterung.html)

The relevant DLG committees have published various instruction leaflets on the topic of poultry. DLG instruction leaflet no. 347 on the keeping of young broiler chickens (broilers) was published to accompany this test report topic. These instruction leaflets are available free of charge in PDF format at: [www.dlg.org/merkblaetter.html](http://www.dlg.org/merkblaetter.html)

### Test execution

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### DLG Testing Framework

DLG test specification "Poultry feeding bowls", version 1.2/2014

### Field

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## The DLG

In addition to conducting its well-known tests of agricultural technology, farm inputs and foodstuffs, the DLG acts as a neutral, open forum for knowledge exchange and opinion-forming in the agricultural and food industry.

Around 180 full-time staff and more than 3,000 expert volunteers develop solutions to current problems. More than 80 committees, working groups and commissions form the basis for expertise and continuity in technical work. Work at the DLG includes the preparation of technical information for the agricultural sector in the form of instruction leaflets and working documents, as well as contributions to specialist magazines and books.

The DLG organises the world's leading trade exhibitions for the agriculture and food industry. In doing so, it helps to discover modern products, processes and services and to make them transparent to the public.

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### The DLG Test Center Technology and Farm Inputs

The DLG Test Center Technology and Farm Inputs in Groß-Umstadt sets the benchmark for tested agricultural technology and farm inputs and is the leading provider of testing and certification services for independent technology tests. With the latest measurement technology and practical testing methods, the DLG's test engineers carry out testing of both product developments and innovations.

As an EU-notified test laboratory with multiple accreditations, the DLG Test Center Technology and Farm Inputs provides farmers and practitioners with important infor-

mation and decision-making aids, in the form of its recognised technology tests and DLG tests, to assist in the planning of investments in agricultural technologies and farm inputs.

### ENTAM

European Network for Testing of Agricultural Machines is the association of European test centres. ENTAM's objective is the Europe-wide distribution of test results for farmers, agricultural equipment dealers, and producers.

More information about the Network is available at [www.entam.com](http://www.entam.com) or by writing to ENTAM at the email address: [info@entam.com](mailto:info@entam.com)



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