Kverneland Group

Kverneland CLC pro Classic

Quality of work

DLG Test Report 6029F

FOKUS TEST
08/11 Quality of work

Applicant and manufacturer
Kverneland Group
Deutschland GmbH
Coesterweg 25
D-59494 Soest
Telephone: +49 (0)2921 3699-0
Fax: +49 (0)2921 3699-408
info.de@kvernelandgroup.com
www.kverneland.com

DLG e.V.
Test Center
Technology and Farm Inputs

Brief description

Universal cultivator with the following characteristics

- Three-bar cultivator with 10 tines
- Gradation: 280 mm
- Frame height: 870 mm
- Row spacing: 810 mm
- Share-quick change system "Knock-on" (3-part) consisting of a bracket, baffle and share tip
  - Stubble processing: 320 mm wing share
  - Soil tillage: 80 mm share tip
- Drag tines planer unit
- Closed steel roller "Actipack"
- Three-point linkage cat. II/III
- 3 meter working width

Content

In DLG focus test "Quality of Work" the pulling power requirement, the tractive force, the fuel consumption, the working depth, the soil crumbling effect and soil density was assessed according to the test programme for drawn tillage equipment.

To assess the "handling" of the new share change system the share change, compared to the previous system, was performed with different persons and the individually required time was recorded.

The soil samples for sieve analysis were extracted with a sampling device at the operating depth within a sampling area of 20 x 20 cm. During every repeated travel cycle six soil samples were extracted and subsequently air dried until a constant weight was achieved. The air-dried samples were sieved through a round-hole sieve. The weighted mean diameter (GMD) is calculated from the individual soil samples. This provides information on the average crumb size, and thus on the fineness of the ground surface.

The re-compacting is determined by the degree of the soil density. In the first soil cultivation cycle, the samples are extracted with sampling rings with a diameter of 6 cm down to a depth of 4 cm, and in the second soil cultivation cycle with sampling rings with a diameter of 9 cm down to a depth of 12 cm depth.

The straw inclusion is rated at the right outer rim of the soil cultivation track when the soil profiles are exposed. The rating includes a 4.5 x 4.5 cm grid at a width of 2 m and a depth of 0.25 m (210 fields).

Two soil cultivation cycles

During the test, two soil cultivation cycles were performed: The shallow stubble break and deeper cultivation. The aim of the first soil cultivation cycle is to create an optimal germ environment for volunteer grain and weed seeds. In the second soil cultivation cycle the straw is to be mixed in and possibly a seedbed for a cover crop seeding created.

The measurements were made on wheat stubble. The soil types of the test surfaces were silty loam (uL) and sandy loam (sL).

A CLAAS Arion 540 tractor with 96 kW (130 hp) was used as a tractor vehicle. This tractor was equipped with the modular measurement system from the DLG Test Center.

Other criteria were not tested or evaluated.

Description and technical data

The cultivator "CLC pro Classic" is offered by Kverneland as a universal device for the initial stubble clearing and the deeper cultivation. It is adjustable to perform a shallow as well as a deep tillage down to a depth of 30 cm. The 3 bar cultivator with bolted tine holders has a frame height of 870 mm and a line spacing of 280 mm, so that a good travel cycle can be guaranteed even with a high proportion of organic matter. On the bars there are bolted, heat treated hollow beams which are secured against an overloading through leaf springs. These special beams are designed to be movable up to 14 cm in case they come into contact with obstacles. The release pressure of the springs according to the manufacturer is 450 kg.

Figure 2:
Rear roller unit

The "CLC per Classic" can be equipped with various interchangeable tips and rear rollers.

The "Actipack-roller" with a diameter of 560 mm is recommended by the manufacturer for the soil cultivation of medium to heavy soils and also for stony ground. The closed roller body will enable a good re-compacting even for difficult ground soil with a relatively high humidity. The scrapers are used to clean the roller. An integrated knife rail can be adjusted as needed. Through this the crumbling of the soil can be influenced. The application pressure of the knife rail can be adjusted in three steps. In addition, there is a position to completely lift away the rail.

The cultivator is equipped with lighting.

All tools required to perform adjustments as well as the instruction manual and the spare parts catalog are housed at the three-point linkage assembly of the machine at the time of delivery.

Table 1: Technical data

Technical data*		
Working width	[m]	3.00
Transport width	[m]	3.00
Number of tines		10
Row spacing	[cm]	810
Line gradation	[mm]	280
Weight with Actipack-Roller	[kg]	1879
Min. HP		90
Max. HP		200

* Manufacturer's specifications

Figure 3:
Wing share 320 mm

Figure 4:
Share tip 80 mm

Test results

The conditions were extremely wet on the two measurement days. Approximately 200 mm of rain fell in the two months before the first cycle. Between the two measurement days approximately further 48 mm of rain fell. During the first soil cultivation cycle the sandy loam soil moisture was 15 %, and the silty loam soil moisture was 21 %. During the second soil cultivation cycle it was somewhat drier with the sandy loam soil moisture at 13 %, and the silty loam soil moisture at 19 %. The experiments were carried out on a flat and homogeneous surface. Due to the very dry spring season, the straw yield was relatively low and the straw was chopped.

First soil cultivation cycle

For the first stubble cut the test cultivator was equipped with the new Share Quick Change System "Knock-on", which consists of three parts: Schar, holder and baffle. In the test, a 320 mm wing share with an 80 mm coiled baffle was used.

The wing share of the "CLC pro Classic" was able to cut the soil at a depth of 5 cm and level over the entire area (see Figure 5).
The existing organic material was uniformly incorporated into the soil. Weed seeds and volunteer grains were provided with good germination conditions.
In the upper 4 cm layer of the soil, after the soil cultivation was completed, a density of 1.02 g/cm³ in the sandy loam and a density of 0.98 g/cm³ in the silty loam could be measured.

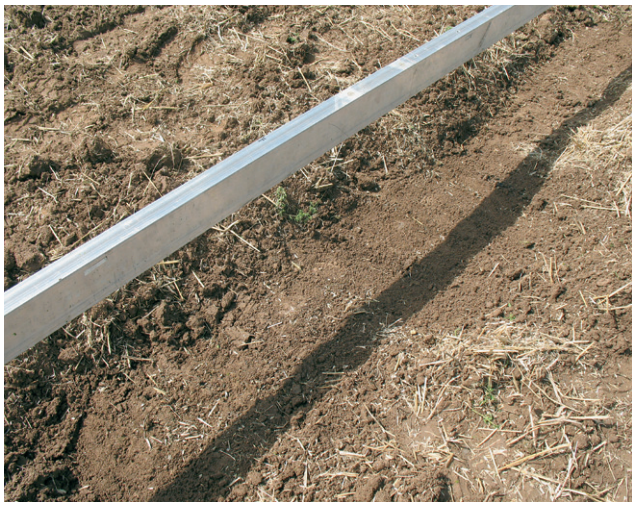

Figure 5:
Cultivation horizon of the stubble processing

Figure 6:
Cultivation horizon of the second, deeper soil cultivation

Second soil cultivation cycle

For the second soil cultivation cycle, the basic configuration of the "Knock-on" Share System with the holder and baffle was maintained. Only the 320 mm wing share was replaced with a 80 mm share tip. The working depth during the second soil cultivation was where the 80 mm wide share tips perform their work at about 16 cm, in the spaces in between at about 12 cm. Figure 7 shows the soil profile before and after soil cultivation with the wavy cultivation horizon of the share in a graphical manner. The re-compacting through the machine provides a soil density of 1.05 g/cm³ at a depth of 12 cm in the sandy loam, and 1.06 g/cm³ in the silty loam. As during the first soil cultivation cycle, a uniform re-compacting could be achieved across the entire working width. Throughout the test, the cultivator did not demonstrate any problems, and provided a good work quality during the first and second soil cultivation cycle. The performance and consumption data is in the average range. Despite the difficult test conditions due to the high soil moisture and the low amount of straw, the straw incorporation was sufficient (see Figure 8).

Table 2:
Performance and consumption data for the first soil cultivation operation

Soil type		sandy loam	silty loam
Fuel consumption	[l/hectare]	7.6	9.5
speed	[km/h]	11.3	9.0
Tractive force	[kN]	22.3	23.2
Traction performance	[kW]	70.1	57.9
Power requirement	[kW/m]	24.0	19.8

Table 3:
Performance and consumption data for the second soil cultivation operation

Soil type		sandy loam	silty loam
Fuel consumption	[l/hectare]	12.5	13.5
speed	[km/h]	7.2	6.5
Tractive force	[kN]	32.4	35.3
Traction performance	[kW]	64.8	63.2
Power requirement	[kW/m]	22.2	21.6

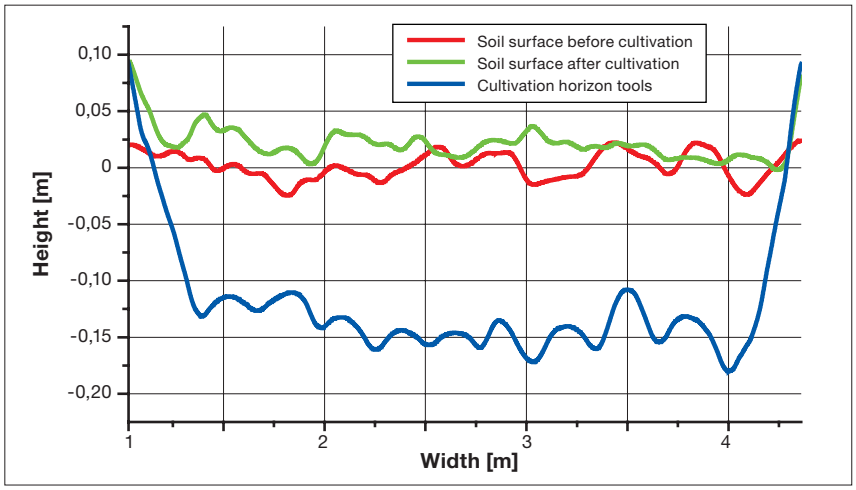

Figure 7:
Soil surface and the cultivation horizon during the 2. soil cultivation cycle

Table 4: Aggregate size distribution and GMD

Aggregate size		silty loam		sandy loam	
		1. Soil cultivation	2. Soil cultivation	1. Soil cultivation	2. Soil cultivation
< 2.5 mm	[%]	19.4	15.8	39.2	36.2
2.5-5 mm	[%]	15.6	12.5	21.3	20.3
5-10 mm	[%]	14.4	12.2	19.1	18.3
10-20 mm	[%]	15.8	13.4	12.9	14.1
20-40 mm	[%]	16.0	14.9	5.9	7.6
40-80 mm	[%]	12.8	15.7	1.5	3.7
> 80 mm	[%]	5.9	15.8	0.0	0.0
GMD *	[mm]	22.7	33.1	7.3	9.2

* GMD = weighted mean diameter

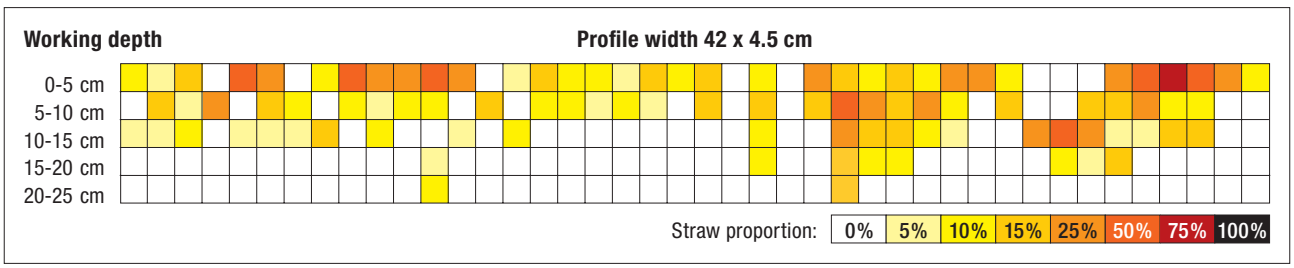

Figure 8:
Evaluation of the straw incorporation after the second operation in the silty loam

Handling

An exceptional feature of the Kverneland "CLC pro Classic" is the new "Knock-on" share exchange system. This enables a share exchange of ten shares within 2 minutes. The system consists of the components holder, baffle and share. For the assembly, the holder is first bolted to the beam, and subsequently the baffle is screwed on. It is placed into the holder, and also attached with a screw. The baffle is secured against twisting through a "tongue and groove" system.

Through the conical attachment system, the share tip can be exchanged within a few seconds and with 2-3 blows using the special tools which are contained in the scope of delivery. During the test, two people performed the share exchange in sequence, with the bolted system as well as with the "Knock-on" system. Table 5 shows the average time consumption for both systems. With the new "Knock-on" system of exchange of the share tip can be performed quickly and easily within a very short time.

Depending on the desired working depth, the "Knock-on" system can be equipped with different share tips. These include a 320 mm wing share as well as a 150 mm and 80 mm share tip. In order to facilitate the loosening up of the soil and to reduce the wear, there is an elevation incorporated into the share. According to the manufacturer's specifications, the holder must only be replaced after every 4-10 share tips depending on the respective on-site conditions.

Table 5:
Time comparison share exchange

Share exchange system	Share Exchange with the "Knock-on" system	Share Exchange with the screw system
Time [min]	1.5 minutes	over 20 minutes

A depth adjustment can be performed in several levels with plug pins. The cultivator is guided through the trailing rear roller.

Setting the rear roller unit

For leveling and re-compacting there is a "Actipack-Roller" and a drag tine unit. Both are coupled to each other and connected to the cultivator through two support arms. The planer unit which consists of 8 drag tines is mounted in a preposition on the roller frame and its angle of attack and working height in various levels can be adjusted with screws. This basic setting is usually performed once per soil cultivation cycle. A spindle is used for the fine adjustment.

On the "Actipack-Roller" the setting of the knife rail can be adjusted. This first of all requires the loosening of two Allen head screws. Then, using a big wrench which is included in the scope of delivery, the three working positions and an elevated position can be adjusted. Through the adjustable application pressure of the knives the crumbling of the soil can be influenced.

Figure 9:
Tool for the share exchange

Figure 10:
Depth adjustment

Figure 11:
Share exchange system "Knock-on"

Figure 12:
"Actipack-Roller"

Test

The first soil cultivation cycle was conducted on August 11, 2011 and the second soil cultivation cycle on September 1, 2011.

Test execution

DLG e.V. –
Test Center
Technology and Farm Inputs,
Max-Eyth-Weg 1,
D-64823 Gross-Umstadt

Field testing

Manfred Horn
64832 Babenhausen

Wolfgang Seeger
64853 Otzberg

Author of the report

M. Sc. Dagmar Pfau

Project director

Dr. Ulrich Rubenschuh

ENTAM registered

ENTAM – **E**uropean **N**etwork for **T**esting of **A**gricultural **M**achines, 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** or by writing to ENTAM at the email address: **info@entam.com**

11-215
November 2011

DLG e.V. – Test Center Technology and Farm Inputs

Max-Eyth-Weg 1, D-64823 Groß-Umstadt,
Telephone 069 247 88-600, Fax: 069 247 88-690, E-mail: Tech@DLG.org,
Internet: www.DLG.org