Satellite tech gaining ground with young farmers
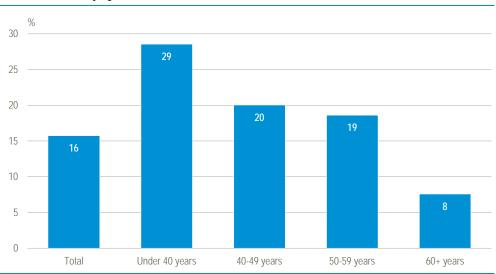
More than one in six farmers use their tractor or combine with precision steering systems. These are GPS systems that make it possible to steer machines to a accuracy of 1-2 cm using RTK signals. Young, highly educated farmers in particular are leading the way in precision agriculture. For example, 29% of farmers under 40 years routinely use RTK-GPS, compared with 16% of all farmers.
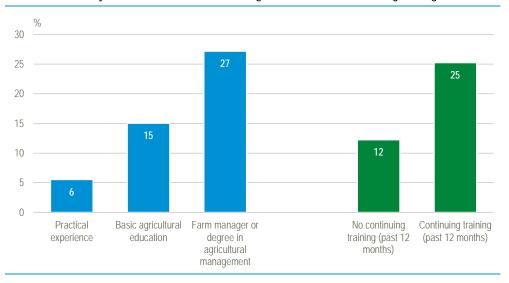
Use of RTK-GPS - by age of farmer

RTK improves the ordinary GPS signals to an accuracy of 1-2 cm using land-based signal stations. RTK-GPS is primarily used on tractors and combines. Alternatives to RTK with less accuracy (3-20 cm) were not included in the survey. 'Total' includes farms with no age for the farmer (i.e. farms not operated by an individual but by companies or institutions, for example).

Farmers with high educational qualifications lead the way

Precision steering is most widespread among farmers with a high level of education. In total, 27% of farmers with farm manager training or a degree in agricultural management use RTK-GPS, compared with 6% of farmers with just practical experience. Correspondingly, farmers who have recently completed continuing training are twice as likely to use RTK-GPS as farmers with no recent continuing training.

Younger farmers have usually completed longer education than older farmers, but for all age groups, a farm manager qualification or degree in agricultural management makes the use of technology more likely.

Use of RTK-GPS - by level of education of farmer - highest level - recent continuing training
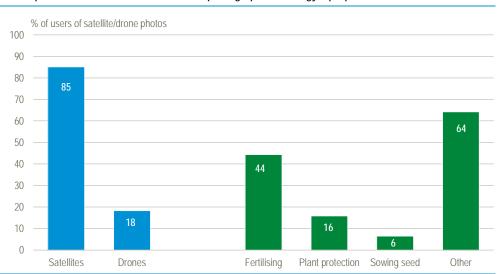

Benefits of RTK-GPS

RTK-GPS enables automatic steering in fixed tracks with less overlap when spraying, scarifying, harvesting, etc., better equipment management, and more accurate use of GPS-based field data on plant density etc. Another advantage is that machinery can operate for longer periods.

Only few use photographic data from space

In recent years, detailed landscape photos have been made available via satellites and drones. As yet, very few farmers (3% of all farms) use such photos to monitor or analyse the condition of their fields.

Among these users, 85% state that the photos come from satellites, while 18% have used drones. A total of 44% draw up application maps for graduated fertilizing. Application maps for plant protection (16%) and sowing seed (6%) are less widespread. The majority of users (64%) state that they use satellite/drone photos for other purposes, e.g. monitoring, drainage, liming, or to draw up a field plan.

Use of photos from satellites and drones - photograph technology - purpose of use

The totals of the bars exceed 100% because farmers use photos for several purposes.
3% of users could not state whether they used satellite or drone photos, e.g. because they did not do the job themselves.
Use of traditional aerial photos from aircraft is not included. Drones are small, unmanned aeroplanes or helicopters.
Figures for use of photos from satellites and drones are subject to some uncertainty because of the small number of users.

Satellite and drone photos are used more extensively by young farmers
Application maps are used to target application of fertiliser etc. on the basis of information on growth and soil conditions. Pictures from satellites or drones can localise growth areas requiring attention by using specialist photo technology.

Of all farmers, only 1.4% use satellite/drone photos for application maps (fertilizing, plant protection, seed sowing). There are other sources for application maps than satellites and drones. In total, 7% use application maps. Other sources include soil samples or sensors on the field or on combines or other machinery.
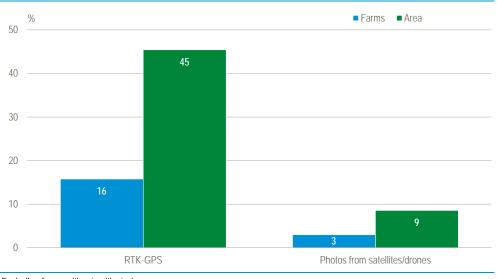
Satellite and drone photos are used more extensively by younger farmers or farmers with higher educational qualifications, following the same pattern as for use of RTK-GPS. However, the narrow extent of use of satellite and drone photos makes it difficult to be accurate about the user profile.

Large farms at the forefront with technology
Precision agriculture is primarily widespread on large farms. Farms using RTK-GPS have an average area of 224 hectares.
 The average area of an arable farm in Denmark is 78 hectares. Farmers who use satellite or drone photos have an average area of 226 hectares.

Precision agriculture is around three-times more widespread in terms of area rather than number of farms. Farmers who steer their machinery using RTK-GPS therefore farm 45% of the total Danish agricultural area, and farmers who use photos from satellites or drones are responsible for 9% of the total area.

Precision agriculture - spread by no. of farms and area

Excluding farms without cultivated area.

Use of precision agriculture by highest level of education of farmer

	Highest level of education of farmer				
	Total	Practical experience	Basic agricultural education	Qualified farm manager	Degree in agricultural management
	no. of farms				
Total farms	**33 580**	**14 636**	**5 555**	**10 913**	**2 476**
Use photos from satellites/drones	987	173	149	513	152
Tractor/combine with RTK-GPS	5 285	810	835	3 036	604

Number of farms with cultivated area
Figures for use of photos from satellites and drones are subject to some uncertainty because of the small number of users.

Use of precision technology by continuing training in the past 12 months

	With/without continuing training		
	Total	With continuing training	Without continuing training
	no. of farms		
Total farms	**33 580**	**24 569**	**9 011**
Use photos from satellites/drones	987	459	528
Tractor/combine with RTK-GPS	5 285	3 010	2 275

Number of farms with cultivated area
Figures for use of photos from satellites and drones are subject to some uncertainty because of the small number of users.

Use of precision technology by age of farmer

	Age of farmer					
	Total	Under 40 years	40-49 years	50-59 years	60+ years	Not stated
	no. of farms					
Total farms	**33 580**	**2 171**	**6 214**	**10 409**	**12 928**	**1 859**
Use photos from satellites/drones	987	105	233	361	197	92
Tractor/combine with RTK-GPS	5 285	620	1 245	1 937	982	501

Number of farms with cultivated area.
'Total' includes farms with no age for the farmer (i.e. farms not operated by an individual but by companies or institutions).
Figures for use of photos from satellites and drones are subject to some uncertainty because of the small number of users.

More information: Other figures from the Agricultural and Horticultural Survey are available at http://www.dst.dk/en/stattable/830.

Sources and methodology: The survey of precision agriculture was conducted as part of the Agriculture and horticulture count and financed in part by the Ministry of Higher Education and Science. Ministry information on Danish space activities (in Danish): Rummet og Danmark.

The results on precision agriculture are based on responses from 6,281 farms in a provisional survey by the Agriculture and horticulture count (approx. 70% of total responses). Population for survey: 33,580 farms with cultivated area (excl. farms without cultivated area, usually greenhouse nurseries and poultry or fur farms).

The questions in the survey refer to all uses in the past 12 months in relation to May 2017. Own use and use via consultants, farm managers, machine stations, etc. have been included.

RTK improves ordinary GPS signals to an accuracy of 1-2 cm using land-based signal stations. RTK-GPS is primarily used on tractors and combines. Alternatives to RTK with less accuracy (3-20 cm) were not included in the survey.

Read more about methodology at Documentation of statistics of the Agricultural and Horticultural Survey.

Next publication: No new surveys of precision agriculture are currently planned..

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