



Natural Resources

Benefits Farmers and Upholds European Agriculture Policies

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In recent years agriculture has gone through a high-tech revolution. Farmers are using newer and more sophisticated technology to increase profits by enhancing crop yields and lowering costs. Around the world, "information agriculture," a technique otherwise known as "precision farming," has rapidly been gaining ground.

In Europe, agriculture has traditionally been governed by the highs and lows of prices, supply and demand. In 1957, the European Economic Community (EEC) decided to implement a "Common Agricultural Policy" (CAP). The CAP sought to increase productivity

of European agriculture, ensure reasonable living standards for farmers, stabilize farm produce markets and guarantee a stable food supply at fair prices for consumers.

The first decade of CAP proved to be a great success: agricultural output grew steadily from 1962 to 1972, leading to self-sufficiency in food accompanied by low consumer prices. But by the beginning of the 1970s, substantial surpluses began to appear, due in part to the economic and technological progress which benefited agriculture. This situation created an oversupply of agricultural products and mounting public concern.

In an effort to solve the problem the European community adopted guidelines that included external protection mechanisms and price controls for agriculture. In 1992, realizing that better methods were necessary, the CAP was again reformed to include the provision of subsidies to those farmers willing to take land out of production. In other words, farmers were paid not to plant their crops. The implementation of this new policy resulted in a need to control agricultural land use throughout Europe.

In Munich, Germany, the Bavarian Ministry of Agriculture and Forestry (StMLF) is responsible for the control of agricultural land use. Bavaria is the largest of Germany's sixteen federal states. With nearly twelve million inhabitants, Bavaria comprises approximately

15% of Germany's overall population. Most of the state's population is concentrated in the two largest cities of Munich and Nurnberg, while the rest of the state is fairly rural and, as a result, fairly agricultural.

The Process

The EEC recommends how much land should be subsidized in each country according to overall agricultural land available across the European continent under the CAP. Farmers are required to fill out forms and return them to the Ministry, listing the type of crops they grow (potatoes, wheat, corn, etc.), and how many square meters they farm. Using this information, the Ministry determines if the farmer made a correct area statement regarding which parcels of land will be subsidized. The



The Bavarian Ministry of Agriculture and Forestry has adopted the Leica GS50 GPS/GIS receiver for determining subsidized crop acreage, in compliance with European agricultural guidelines.



The information collected by the Leica GS50 GPS/GIS downloaded into LAFIS software, a streamlined Geographic Information System (GIS) used to track subsidized agricultural areas.

Ministry then sends its staff to the field to double-check the land area of those parcels.

At first, traditional methods were used to take measurements – field personnel would walk around a parcel with a measuring wheel or a tape measure, which only gives an approximate area. These inexact measurements resulted in conflicts with the farmers about how much land should be taken out of production. The European community quickly realized that more precise measuring methods were needed.

New agricultural guidelines were put in place to combat these irregularities. The new policy, administered by the Integrated Administration and Control System (IACS), called for tighter administration and measuring of agricultural lands eligible for subsidies. IACS Policy states, "This new system of direct aid for farmers (subsidies) will be complemented by 'on-the-spot' controls."

Under these new guidelines the Bavarian Ministry quickly turned to the Global Positioning System (GPS), for a more accurate measurement solution. After evaluating different brands, the Bavarian Ministry decided on the GS50 GPS/GIS receiver from Leica Geosystems. These units are capable of sub-meter accuracy, and can quickly capture points, lines and areas, making it easy to assess the area and perimeter of a field.

According to Mr. Christian Schorr, GPS/GIS Product Manager for Leica Geosystems, "One of the reasons the GS50 was chosen is because it is the only receiver that works efficiently under tree canopy, along field boundaries, or even inside forests. This is due to Leica's

MaxTrak algorithms that allow the receiver to track the maximum number of available satellites under tree canopy. MaxTrak is unique within the GPS industry. Today the Ministry owns sixty receivers."

The information collected by the GS50 GPS/GIS receivers is recorded on a PCMCIA card which is read directly by the Land Area Information System (LAFIS) software. (The "F" in LAFIS is the German abbreviation for area.) LAFIS is a streamlined Geographic Information System (GIS) used to track the subsidized agricultural areas. A custom interface was built so that Ministry staff could easily load the measured areas directly from the GS50 into LAFIS. Mr. Schorr elaborates, "This was possible because the GS50 allows a flexible adaptation of its output to any ASCII format, beside the standard output to shape-file, DXF, or other commonly used GIS data formats."

Once the GPS field data is in the LAFIS, the GIS software can determine which areas need to be taken out of production based on comparisons of overall available acreage. However, one of the key features of a GIS is that it has a spatial component. As such, the GPS can be used to record positions where soil or crop boundaries change, where fertilizer or pesticide levels rise or fall or any number of other factors. The GIS has enormous potential to detect patterns, perform analysis, or even determine better farming practices.

Results

The new IACS policy has been instrumental in reforming agricultural

processes in Europe. A recent audit of the new program concluded that IACS policy was well-designed and has become an essential tool for controlling agriculture expenditure. In addition, the use of GPS has resulted in significant improvements monitoring acreage measurements. The Leica GS50 GPS/GIS receiver is easy-to-use, leading to its widespread adoption for determining acreage subsidies across the European continent.

Overall, the use of GPS by the Bavarian Ministry to determine subsidies has been a success. The Ministry benefits from a streamlined process that saves money and provides a more efficient control in determining area sizes for subsidies. In fact, users of the Leica GS50 GPS/GIS unit within the Bavarian Ministry have commented that they enjoy working with the GS50 and that they would like to equip all of the field offices with additional units. Furthermore, farmers benefit because GPS is a more accurate tool than a measuring wheel, thereby providing a certain "safety net" from errors. Finally, the use of GPS has increased trust between farmers and the government agencies who monitor the subsidies, resulting in an increased spirit of cooperation for all those participating in the program.

For More Information:

Leica Geosystems GmbH Vertrieb
Hans-Bunte-Strasse 5
80992 Munich
Bavaria-Germany
Phone ++49 89 149810 0

To learn more, call 1-866-LEICAGIS or visit www.gis.leica-geosystems.com

Leica Geosystems Inc. 23868 Hawthorne Blvd., Torrance, CA 90505-5908 USA
US/Int'l Tel: (310) 791-5300 Fax: (310) 791-6108