

FARM SIZE AND THE ECONOMIC FEASIBILITY OF PRECISION AGRICULTURE TECHNOLOGIES

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AGRIFA 2026



RESEARCH FOCUS

Precision agriculture (PA), a key component of Agriculture 4.0, can improve production efficiency through precise input management. However, high investment costs may be harder for smaller farms to recover, making farm economic size an important factor in PA investment feasibility.

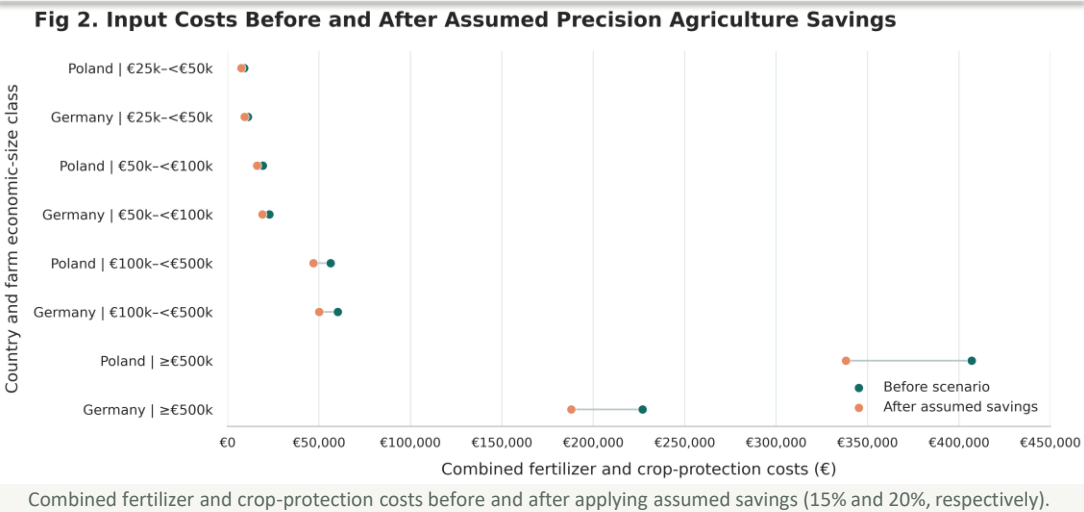
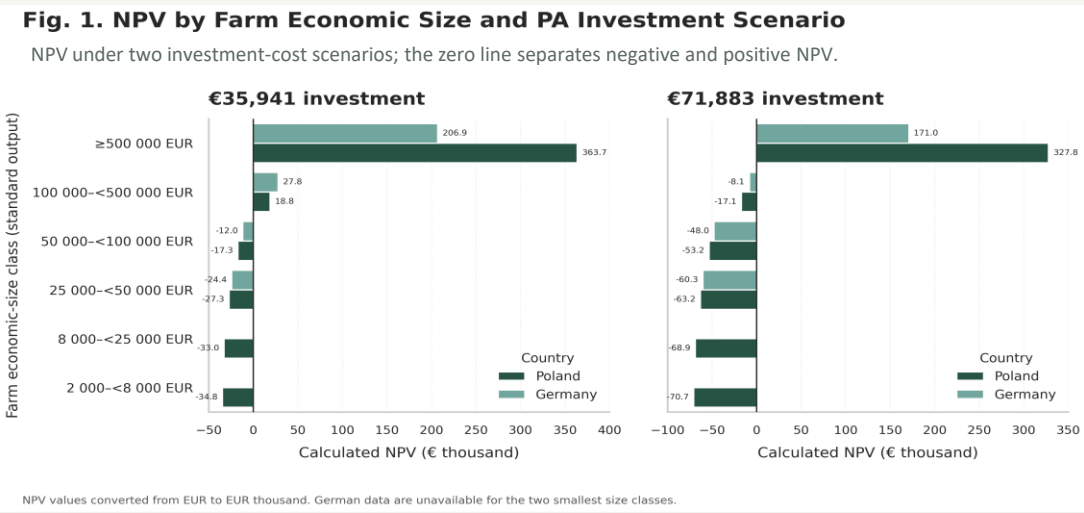
OBJECTIVE

To examine how farm economic size relates to the economic feasibility of PA investment in field-crop farms in Poland and Germany.

DATA & METHOD

- Secondary data from FADN and Eurostat
 - Farms compared by economic-size class
 - Net Present Value (NPV) used to assess investment feasibility
 - Literature-based scenarios: assumed reductions of 15% in fertilizer and 20% in crop-protection costs from more precise application of inputs, with production held constant.
- Investment cost of €35,941 - €71,883

RESULTS



MAIN FINDINGS

- Economic feasibility generally increased with farm size: larger farms were better able to recover investment costs, while smaller farms faced less favorable conditions.
- Lower fertilizer and crop-protection costs could improve farm returns and input-use efficiency after PA adoption.
- At €35,941, positive NPV was obtained for the €100,000 and above classes in both countries.
- At €71,883, positive NPV was obtained only for the ≥€500,000 class in both countries.

CONCLUSION

Farm economic size and investment costs are key factors influencing the economic feasibility of PA adoption. Although PA can improve production efficiency, farms differ in their ability to realize these benefits across size classes.

IMPLICATION & LIMITATION

- Implication:** PA policies should consider farm size and help smaller farms meet upfront costs.
- Limitation:** Literature-based cost and savings estimates, not observed farm-level outcomes