Practices from the ground: The case of Crop Insurance in Poland

Krzysztof Łyskawa, Phd

Agenda

- Agriculture in Poland
  - The current situation
  - The meaning of agriculture in Poland
- A short look at the situation in the insurance market in Poland
- A brief analysis of the market of agricultural insurance (property, liability)
- Crop insurance
  - The subsidized insurance
  - The most frequent events
  - The developments in the future
**Major data regarding agriculture in Poland**

<table>
<thead>
<tr>
<th>Specification</th>
<th>POLAND</th>
<th>Share of Poland in EU (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable land in % of total area</td>
<td>38.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Agricultural population</td>
<td>15.2</td>
<td>25.7</td>
</tr>
<tr>
<td>Yields of cereals per 1 ha in dt</td>
<td>34.2</td>
<td>76.3</td>
</tr>
</tbody>
</table>

Poland is one of the main suppliers of area and people in EU agriculture.

Source: Statistical Yearbook of Agriculture 2016

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**More detailed data regarding agriculture in Poland**

**Farms by area groups of agricultural land in 2009 (in %)**

<table>
<thead>
<tr>
<th>EU-27</th>
<th>&lt;5 ha</th>
<th>5-20</th>
<th>20-50</th>
<th>&gt;=50 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
<td>19</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

**Area farms group [%]**

<table>
<thead>
<tr>
<th>Year</th>
<th>0-5 ha</th>
<th>5-10 ha</th>
<th>10-20 ha</th>
<th>20-50 ha</th>
<th>More than 50 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>65.2</td>
<td>17.1</td>
<td>11.4</td>
<td>4.2</td>
<td>0.8</td>
</tr>
<tr>
<td>2010</td>
<td>54.8</td>
<td>22.2</td>
<td>14.5</td>
<td>6.3</td>
<td>1.7</td>
</tr>
<tr>
<td>2014</td>
<td>53.1</td>
<td>21.9</td>
<td>15.4</td>
<td>7.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Difference</td>
<td>-12.1</td>
<td>4.8</td>
<td>4</td>
<td>3.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**The structure of land use [%]**

<table>
<thead>
<tr>
<th>Year</th>
<th>0-5 ha</th>
<th>5-10 ha</th>
<th>10-20 ha</th>
<th>20-50 ha</th>
<th>More than 50 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>16</td>
<td>18.4</td>
<td>23.5</td>
<td>17.8</td>
<td>24.3</td>
</tr>
<tr>
<td>2010</td>
<td>13.9</td>
<td>16.5</td>
<td>20.8</td>
<td>19.2</td>
<td>29.6</td>
</tr>
<tr>
<td>Difference</td>
<td>-2.1</td>
<td>-1.9</td>
<td>-2.7</td>
<td>1.4</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Farms in Poland are mostly small, but it is changing.

Commodity structure of agricultural production in Poland in 2015.

- The advantage of livestock production over the plant production
- In the field of crop production cereals and vegetables are dominant

Source: Statistical Yearbook of Agriculture 2016

Major crops in Poland in 2015.

- The decrease in production of potato
- High volatility in sugar beet production
- Low production of rapeseed - calculated in tones

Source: Statistical Yearbook of Agriculture 2016
Air temperature fluctuations in Poland (average of the years 1971-2000)

- The frequency of extreme temperatures is growing both in winter and in summer
- More often winter temperature is higher than the long-term average

Source: Statistical Yearbook of Agriculture 2016

Rainfall in relation to the standards in Poland (average of the years 1971-2000)

- An increasing frequency of rainfall during summer
- A decrease is observed in rainfall during winter

Source: Statistical Yearbook of Agriculture 2016
Agricultural insurance background of the present situation

- The compulsory crop insurance during the socialist age - high prevalence, but no conscious use as a tool in risk management
- A turn away of crop insurance after 1989
- Multiple instruments of aid to agriculture in difficult situations – lost the use of 53 tools after Poland entered EU
- Farmers’ expectation to use ad-hoc state aid
- The introduction of subsidized crop insurance and livestock in 2006.
- The compulsory insurance of crops for at least one risk since 2008

Problems in the compulsory insurance - other than crop insurance

- Fire and natural perils, but are conducted as a compulsory insurance of farm buildings
  - The scope of insurance is narrower than could be achieved on the commercial insurance market,
  - Inaccurate rules of paying compensation (according to which the compensation is calculated: a replacement value or a real one)
  - A lack of consent to contract becomes more common (eg. chicken coops, historical buildings, leased from National Agency).
  - An increasing contribution rates for buildings insurance
Problems in the compulsory insurance - other than crop insurance

- Liability insurance of farmers
  - The increasing scale of claims, even in the face of risk characteristics (the neighbours)
  - Very vague concept of “managing farm”
  - A very wide range of coverage of the compulsory insurance / entities subject
  - The lowest price liability insurance on the market and amount of cover is 5 mln EURO

Area of the insured crops

The insurance potential is up to 13 mln ha
Anticipated (desired) area to be insured: min 7 mln ha

“min 50% of crops insurance obligation”
Structure of the insured risks in crops
(number of insurance contracts – in thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>hail</td>
<td>88.4</td>
<td>174.5</td>
<td>188.0</td>
<td>171.8</td>
<td>169.9</td>
<td>181.3</td>
<td>202.5</td>
<td>541.9</td>
</tr>
<tr>
<td>spring frossts</td>
<td>72.2</td>
<td>67.8</td>
<td>73.6</td>
<td>69.9</td>
<td>77.7</td>
<td>75.0</td>
<td>92.9</td>
<td>393.9</td>
</tr>
<tr>
<td>winterkill</td>
<td>71.7</td>
<td>44.6</td>
<td>50.8</td>
<td>54.2</td>
<td>63.0</td>
<td>66.6</td>
<td>72.4</td>
<td>372.2</td>
</tr>
<tr>
<td>drought</td>
<td>14.1</td>
<td>9.0</td>
<td>1.5</td>
<td>0.6</td>
<td>0.3</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>flood</td>
<td>13.7</td>
<td>1.9</td>
<td>2.1</td>
<td>0.6</td>
<td>0.3</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>hurricane</td>
<td>13.7</td>
<td>1.4</td>
<td>4.6</td>
<td>5.0</td>
<td>6.5</td>
<td>11.3</td>
<td>15.6</td>
<td>17.0</td>
</tr>
<tr>
<td>rain storm</td>
<td>13.7</td>
<td>1.4</td>
<td>4.6</td>
<td>5.0</td>
<td>6.5</td>
<td>11.3</td>
<td>15.6</td>
<td>17.0</td>
</tr>
<tr>
<td>lightning</td>
<td>13.6</td>
<td>1.3</td>
<td>4.6</td>
<td>4.9</td>
<td>4.9</td>
<td>5.5</td>
<td>7.2</td>
<td>7.2</td>
</tr>
<tr>
<td>landslides</td>
<td>13.6</td>
<td>1.3</td>
<td>4.6</td>
<td>4.9</td>
<td>4.9</td>
<td>5.5</td>
<td>7.2</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Source: Own work on the basis of data from MRiRW

- In Poland, crops are most frequently insured against the risk of hail.
- Insurance agreements are most often executed in specifically prepared packages covering 2 or 3 risks.

Basic elements related to the functioning of subsidized insurance

- The conclusion of agreements between insurers and the Ministry of Agriculture
- The scope of the protection
- "Packages" of insured events
- The obligation of the insurance contract for the farmer
- The specified maximum amount of the premium rates, "reinsured" by the state budget in case of drought
- Compliance with existing EU law
- Definitions of events covered by a contract
The events covered by subsidized crop insurance

- **Winterkill**: Supersede, or blowing up plants, in the period from 1 December to 30 April, consisting of total or partial destruction of plants or a complete loss of a yield or a part of it.
  - Temperatures drop below 0 °C, in the period from 15 April to 30 June, involving the total or partial destruction of plants or a complete loss of a yield or a part of it.
  - Occurrence in any sixty day period from 21 March to 30 September of the climatic water balance fall below the value specified for each crop species and soil.

- **Spring frosts**: Increase the levels of running or standing water, flooding areas by heavy rainfall, water runoff on slopes or slopes in mountain and submontane.

- **Hail**: Atmospheric precipitation consists of lumps of ice.

- **Drought**: Occurrence in any sixty day period from 21 March to 30 September of the climatic water balance fall below the value specified for each crop species and soil.

- **Flood**: Increase the levels of running or standing water, flooding areas by heavy rainfall, water runoff on slopes or slopes in mountain and submontane.

- **Others**: Hurricane, torrential rain, lightning, avalanches, landslides.

### The amount of compensation paid (in thous. Euro)

<table>
<thead>
<tr>
<th>Type of event</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drought</strong></td>
<td>44.882</td>
<td>314</td>
<td>151</td>
<td>524</td>
<td>28</td>
<td>9</td>
<td>21</td>
<td>43</td>
</tr>
<tr>
<td><strong>Flood</strong></td>
<td>87</td>
<td>362</td>
<td>1092</td>
<td>460</td>
<td>258</td>
<td>404</td>
<td>250</td>
<td>97</td>
</tr>
<tr>
<td><strong>Winterkill</strong></td>
<td>256</td>
<td>524</td>
<td>7883</td>
<td>38,993</td>
<td>140,448</td>
<td>3105</td>
<td>2483</td>
<td>2052</td>
</tr>
<tr>
<td><strong>Spring frosts</strong></td>
<td>828</td>
<td>7,608</td>
<td>2,015</td>
<td>33,315</td>
<td>1,765</td>
<td>791</td>
<td>30,814</td>
<td>6,781</td>
</tr>
<tr>
<td><strong>Hail and others</strong></td>
<td>8,942</td>
<td>19,109</td>
<td>13,304</td>
<td>14,500</td>
<td>29,234</td>
<td>31,767</td>
<td>27,505</td>
<td>31,090</td>
</tr>
</tbody>
</table>

*Source: own work on the basis of data from PIU and insurers*
The claims paid exceeded the level of PLN 2.6 bln.
The premium collected was ranging at the level of PLN 2.5 bln.
In the long-term aspect, crop insurance is not viable.
A small number of insurance companies are providing crop insurance (3 companies).

Economic aspects of winter kill loss adjustment – example of rape seeds

- Basic parameters of the crops condition
- Economic goal of received payment
- Continuation of rape cropping after winter damage – economic effects
  - Replacement crop
  - Revenue loss reduction
  - Losses related to crop rotation
## Definition of winter kill damage in rape

<table>
<thead>
<tr>
<th>TUW TUW*</th>
<th>PZU S.A.*</th>
<th>Concordia Polska TUW</th>
<th>HDI Asekuracja</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clarifying the event causing compensation payment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of alive plants per 1 square meter below 20</td>
<td>51 percent decrease the average plants amount per 1 square meter comparing to the average plants amount per 1 square meter declared before issuing policy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Amount of compensation

<table>
<thead>
<tr>
<th>30% of sum insured (damage before 15th of April)</th>
<th>25% of sum insured (damage before 15th of April)</th>
<th>27% of sum insured. The ability to insure the payment of 35% of sum insured – the necessity of paying additional premium</th>
<th>33% of sum insured</th>
</tr>
</thead>
</table>

Source: own work on the basis of: [Concordia 2012], [TUW 2011], [PZU 2011a], [HDI Asekuracja 2011]

### Costs and Revenue

<table>
<thead>
<tr>
<th>Item</th>
<th>Rape seed</th>
<th>Barley</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Seed grain</td>
<td>320.00</td>
<td>339.68</td>
</tr>
<tr>
<td>2. Fertilisation (ammonium sulphate, Polfoska 6-20-30 Ca/Mg every 4 years)</td>
<td>1603.39</td>
<td>1106.58</td>
</tr>
<tr>
<td>3. Plant protection</td>
<td>632.79</td>
<td>120.88</td>
</tr>
<tr>
<td>4. Services (combing, liming plus press):</td>
<td>440.55</td>
<td>538.18</td>
</tr>
<tr>
<td>5. Tractor work (plowing, sowing, spraying, transport)</td>
<td>682.03</td>
<td>808.84</td>
</tr>
<tr>
<td>6. Tax</td>
<td>185.45</td>
<td>185.45</td>
</tr>
<tr>
<td>7. Farmer’s civil liability</td>
<td>3.90</td>
<td>3.90</td>
</tr>
<tr>
<td><strong>Total direct cost</strong></td>
<td>3868.11</td>
<td>3103.50</td>
</tr>
<tr>
<td>8. General economic cost</td>
<td>951.12</td>
<td>951.12</td>
</tr>
<tr>
<td><strong>including amortization</strong></td>
<td>632.70</td>
<td>658.68</td>
</tr>
<tr>
<td>9. Labour cost</td>
<td>300.00</td>
<td>280.00</td>
</tr>
<tr>
<td><strong>Total cost</strong></td>
<td>5119.23</td>
<td>4334.63</td>
</tr>
<tr>
<td><strong>Revenue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield net value (dt)</td>
<td>5660.10</td>
<td>3333.60</td>
</tr>
<tr>
<td>Lump-sum VAT return</td>
<td>396.21</td>
<td>233.35</td>
</tr>
<tr>
<td>Side-product, (straw) subsidy to seed grain</td>
<td>-</td>
<td>385.57</td>
</tr>
<tr>
<td>Direct subsidy (PLN/ha)</td>
<td>984.78</td>
<td>984.78</td>
</tr>
<tr>
<td><strong>Total revenue</strong></td>
<td>7041.09</td>
<td>4937.31</td>
</tr>
<tr>
<td><strong>Profit/loss (PLN/ha)</strong></td>
<td><strong>1921.85</strong></td>
<td><strong>602.68</strong></td>
</tr>
</tbody>
</table>
The ability to replace the tangible assets ratio

- The information about in to what extend farm can invest or how much the amortization was consumed
- The negative effect indicates that as a result of current farm managing farmers consumes legacy previous generation

Methodology: if farm profits, then the ability to replace the tangible assets (ARTA) is as profit (P) to amortization relation (A) + 100%. If farm losses (L) then we supstract this realtion from 100%.

Value of the ratio: [Pabiszczak, Wysocki 2013].
If profit

\[ ARTA = 100 + \left( \frac{PROFIT}{A} \right) \times 100 \]

If loss

\[ ARTA = 100 - \left( \frac{LOSS}{A} \right) \times 100 \]

What is the reality today?

- Agriculture in Poland is a very important area of the economy and its development also requires the progress of insurance services
- Insurers are willing to offer traditional, compulsory property insurance and liability one
- Crop insurance offered in Poland does not cover all existing threats because of the lack of an acceptable price to the offered drought insurance
- The new solution, prepared by the Polish government, can bring opportunities and challenges both for the farmers and the insurers
- We should do more researches on the cost effectiveness of this product for insurers and to achieve compliance with EU regulations
Difficulties noticed by farmer

<table>
<thead>
<tr>
<th>Clients opinion</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance obligation</td>
<td>Unfounded introduction of the obligation, no insurance policy as the cause of lack of post-disaster credit, no control over the fulfillment of the obligation</td>
</tr>
<tr>
<td>High insurance price</td>
<td>No acceptance of the price for insurance if higher than 2.5% of the insurance sum paid by a farmer</td>
</tr>
<tr>
<td>Lack of contributions to premiums for groups of clients</td>
<td>Refers to „large” entities, vegetable and fruit producers</td>
</tr>
<tr>
<td>Lack of possibility to insure particular risks</td>
<td>No insurance cover against damage caused by game, inland birds, diseases and pests</td>
</tr>
<tr>
<td>Lack of attractive livestock insurance</td>
<td>Limited insurance offer covering the death of livestock or the necessary slaughtering resulting from disease or accident</td>
</tr>
<tr>
<td>Indemnities do not cover the ensuing damage</td>
<td>Farmers’ doubts as a manner of damage assessment, primarily in the case of negative effects of wintertime</td>
</tr>
</tbody>
</table>


Difficulties noticed by Government Institutions

- Small number of Insurance Companies involved in insurances with subsidies from the State budget
- Incomplete use of resources for contributions to premiums
- Expectation of even greater commitment to the farming communities in the legislative processes connected with crop and livestock insurances
- Problems with the assessment of the financial contribution of the State budget to the indemnities
- Limited possibility to aid the farmers in the case of attritional events – dilemma whether to choose: insurance or social aid

Potatoes and drought
The basic information about Project PEPEES S.A.

Objective 1: To create a solution that would protect farmers from the effects of a damage caused by random events: hail, frost, torrential rain and drought. At the same time this action is to cause more loyal suppliers in relation to Pepees.

Objective 2: To secure any additional costs that have to be born by Pepees in the event of a damage in crops contractors - these situations cause an increase in fixed costs, a reduced amount or degraded material quality for a processing.

The basic information about Project

• The offer is aimed at all farmers cooperating with Pepees
• In the years, the number of the farmers was nearly 1500 and they grew potatoes in the area of more than 6000. The number of farmers is expected to increase 10% every year.
• Seed potatoes are delivered by Pepees. Kuba, Jasja, Glada, Skawa, Inwestor are the most often used kinds.
• The frequency of growing these crops is at a high level. Additionally, a single farmer is able to produce 3-4 kinds of it.
• Recent cooperation with farmers has resulted the fact that the coordinators know what sort of seeds may fit the best to every farmer and soil conditions.
• The whole technological process (planting, cultivation, gathering) is conducted by the support of coordinators who co-work with particular farmers.

mentor.pl
The payment of a lump sum depends on the estimation of the indicator of the trigger levels for climatic water balance for potatoes in different soil types (according to the Drought Monitoring System IUNG).

<table>
<thead>
<tr>
<th>Period</th>
<th>Category of soil</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>May - June</td>
<td>-240 -260 -300 -320</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June - July</td>
<td>-220 -250 -280 -300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July-August</td>
<td>-160 -170 -200 -220</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Details: in the event of the threshold of Drought Monitoring System - payment for a farmer a lump sum in the amount of PLN 1000 (estimated sum insured per 1 ha = 10 000 PLN) and PLN 300 for the decrease of a starch (paid twice for the agricultural producer and Pepes).

Optionally: payment of higher lump sum when CWB will fall 10% or 20% below the critical value.

The climatic water balance (CWB)

CWB expresses the difference between the precipitation and the potential evapotranspiration:

\[
\text{CWB} = P - \text{ETP}
\]

Where:
- CWB - Climatic Water Balance
- P - precipitation in a given period
- ETP - Penman evapotranspiration in a given period
Effects - The methods of concluding insurance contracts

The scope of cover

- Hail
- Torrential rain
- Hurricane

Loss of income as a result of water shortage

In the case of basic events (hail, torrential rain, hurricane) the insurer (Concordia Poland TUW) pays compensation:

a) a decrease in yield (less harvested potatoes) and

b) loss in the amount of starch.

Compensation for loss of starch is 2% of the sum insured (yield x price) for each hectare affected by the damage, but on the condition that the loss in yield due to hail, torrential rain or a hurricane reached more than 20%.

Example: A compensation for hail

- The estimated yield of 25 tons / ha, price: 280 zł / t, area of 5 ha
- The sum insured entered in the insurance policy - 7 000 PLN / ha: SU = 25t x 280 zł / t x 5 ha = 350 000 PLN

- The estimated loss of 2 hectares is 22%
- The compensation amounts to = 7 000 PLN x 22% x 2 ha = 3 080 zł

- Damage exceeded 20%, so there is a surcharge for starch
- 2% x 7 000 PLN x 2 ha = 2 800 PLN

The sum insured

- The estimated yield of 25 tons / ha, price: 280 zł / t, area of 5 ha
- The sum insured entered in the insurance policy - 7 000 PLN / ha: SU = 25t x 280 zł / t x 5 ha = 350 000 PLN
Effects - The methods of concluding insurance contracts

With regard to claims arising from water shortage lump-sum benefit will be paid under the following conditions:

- Display of IUNG municipalities as at risk of getting drought
- Check the page Drought Monitoring
- The actual loss in yield in the field

The sum insured:
- The estimated yield of 25 tons / ha, price: 280 zł / t, area of 5 ha
- The sum insured entered in the insurance policy - 7 000 PLN / ha: SU = 25 t x 280 zł / t x 5 ha = 35 000 PLN
- IUNG indicates the municipality, on the field is a threat of drought
- Concordia Poland calculates the yield loss as higher than 35%
- Damage exceeded 35%, hence shall be paid a lump sum:
  - 20% x 7 000 PLN x 5 ha = 7 000 PLN

The aim of this solution is to secure suppliers Pepees against a decline in revenues as a result of water shortage, which took place last year.

Conclusions (2)

1. It is necessary to collect and share data from all available systems. Only complete and reliable data will allow insurance companies to create new products
2. It is necessary to minimize the hazards associated with the seeds. There is a necessity to verify the effectiveness of the use of different types of cereal plants in different regions of the European Union
3. Once created an index insurance product requires verification at least for the first few years. There should be occur acceptance in this area by both parties: farmers and insurance companies.