

Training Course, Berlin
19-30 August 2019



SAKEN SEIFULLIN
UNIVERSITY



New and Innovative Courses
for Precision Agriculture



DEVELOPMENT OF THE ACADEMIC CONTENT AND METHODOLOGY OF “PRECISION AGRICULTURE”

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Definition of Precision Agriculture (PAg)

Precision Agriculture (PAg) is a creative set of:

Precision Farming (PF)

+

Precision Animal Husbandry (PAH)

+

Information technology (IT)

Short history of the Birth of PAg

I. 2003

Precision Agriculture,

Edited by J. Stafford and A. Werner

The book contains peer-reviewed papers that were presented at the **4th European Conference on Precision Agriculture.**

The unique feature of the fourth conference was that it was held in parallel with the 1st European Conference on Precision Livestock Farming – **the links between both technologies were drawn and the possible interactions between them were shown for the first time.**

Short history of the Birth of PAg

II. 2009

«Precision Agriculture»,

Edited by Dieter Spaar and et. Al.

German-Russian project of scientific and technical cooperation "Adaptation of agricultural education and advanced training in the Russian Federation» ended with the publication of the educational and practical manual «Precision Agriculture» (Edited by Dieter Spaar and et. al), Saint Petersburg - Pushkin, 2009.

Германо-российский проект научно-технического сотрудничества «Адаптация сельскохозяйственного образования и повышения квалификации в Российской Федерации» закончился изданием учебно-практического пособия «Точное сельское хозяйство»

Short history of the Birth of PAg

III. 2017

«Precision Agriculture»,

**Astana, 2017. Alipbeki O., Alipbekova Ch., The Textbook
and the Educational-methodical complex of the discipline**

has been released

Short history of the Birth of PAg

IV.

«Precision Agriculture» or Integrated Crop and Livestock Systems (ICLS)

From 2014, the results of systematic scientific research began to appear, which are so far called ISLS.

For example:

Moraine M. and et. al., 2014;

Ryschawy J. and et. al., 2016;

Moraine M. and et. al., 2017;

Garetta R. and et.al., 2017;

Lacombe C. and et.al., 2018;

Alipbeki O. and et.al., 2019, etc.

Simplified Infrastructure of Typical Agricultural Farms

Precision Animal Husbandry

Precision Farming

INPUT



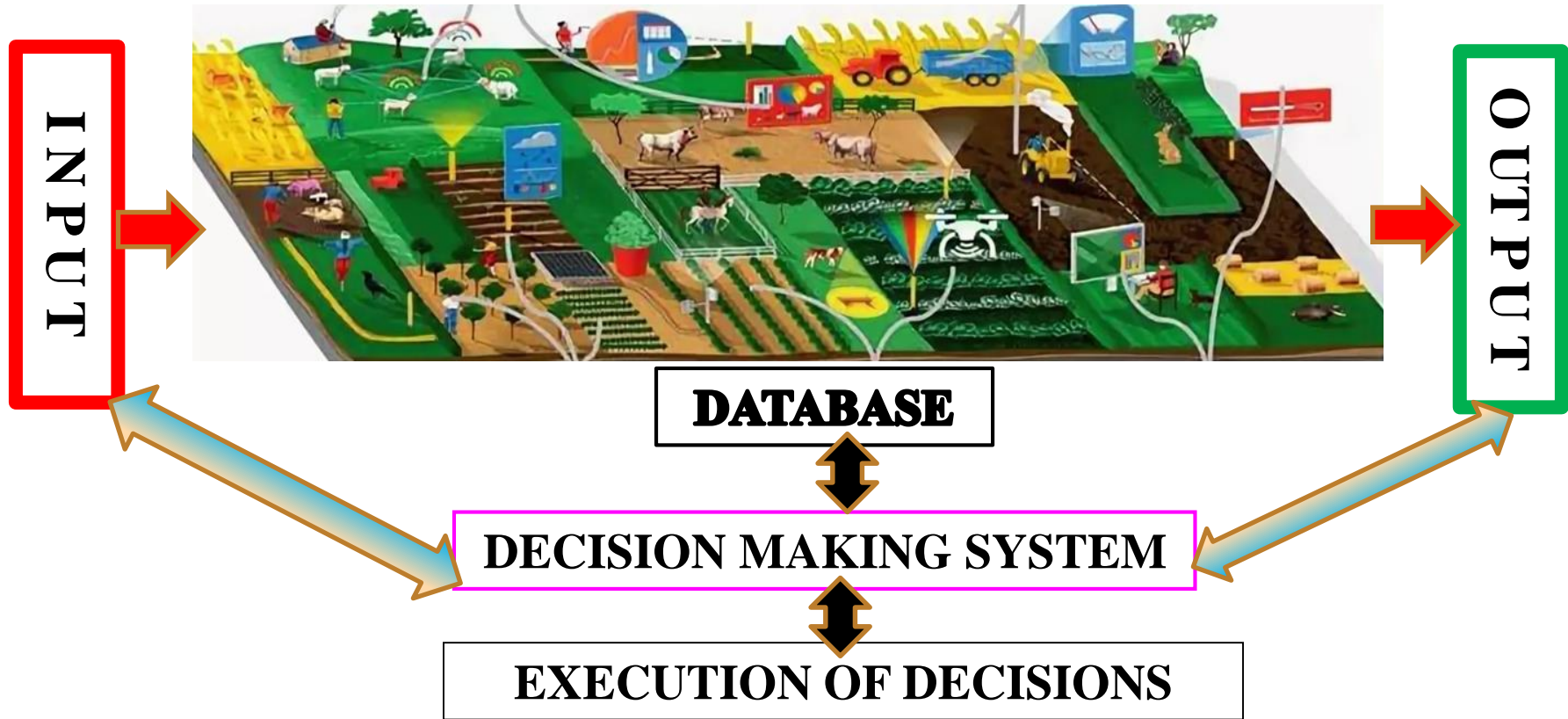
OUTPUT

Crop

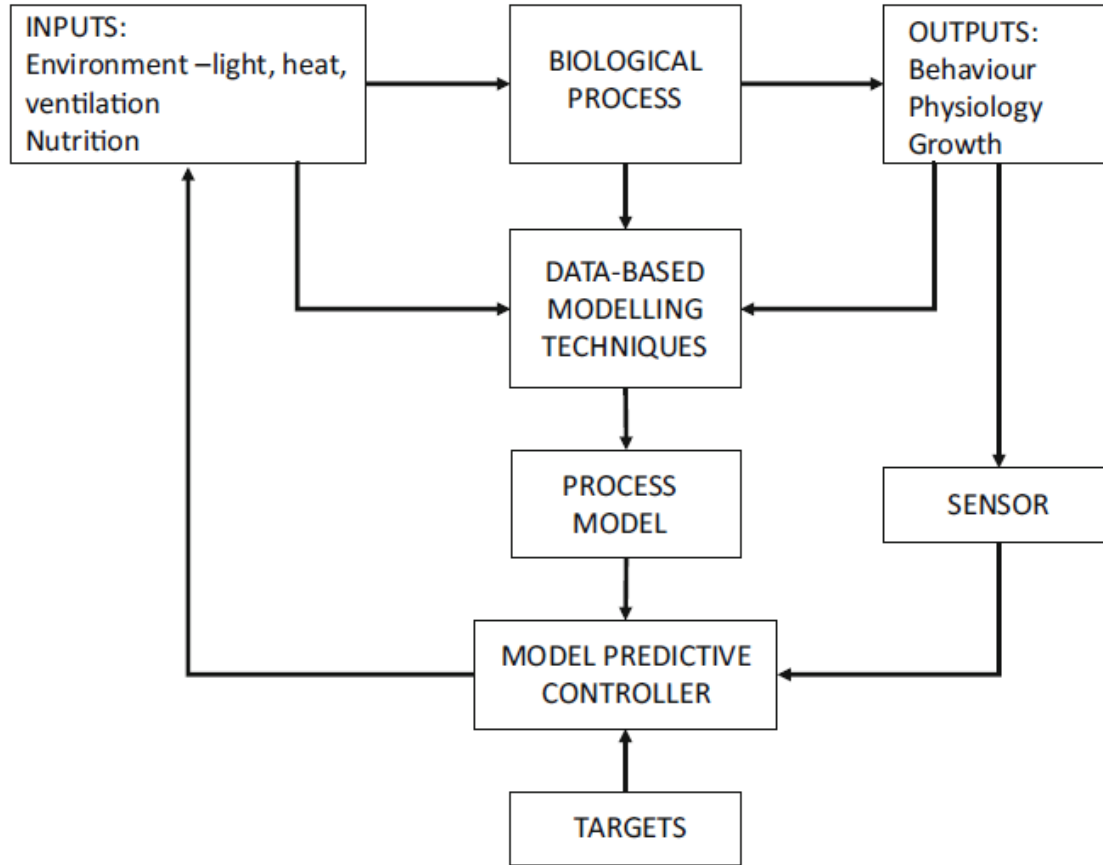
Technologies

Accountings

SIMPLIFIED INFORMATION INFRASTRUCTURE OF TYPICAL AGRICULTURAL FARMS



Precision Agriculture (Wathes et al. 2008)

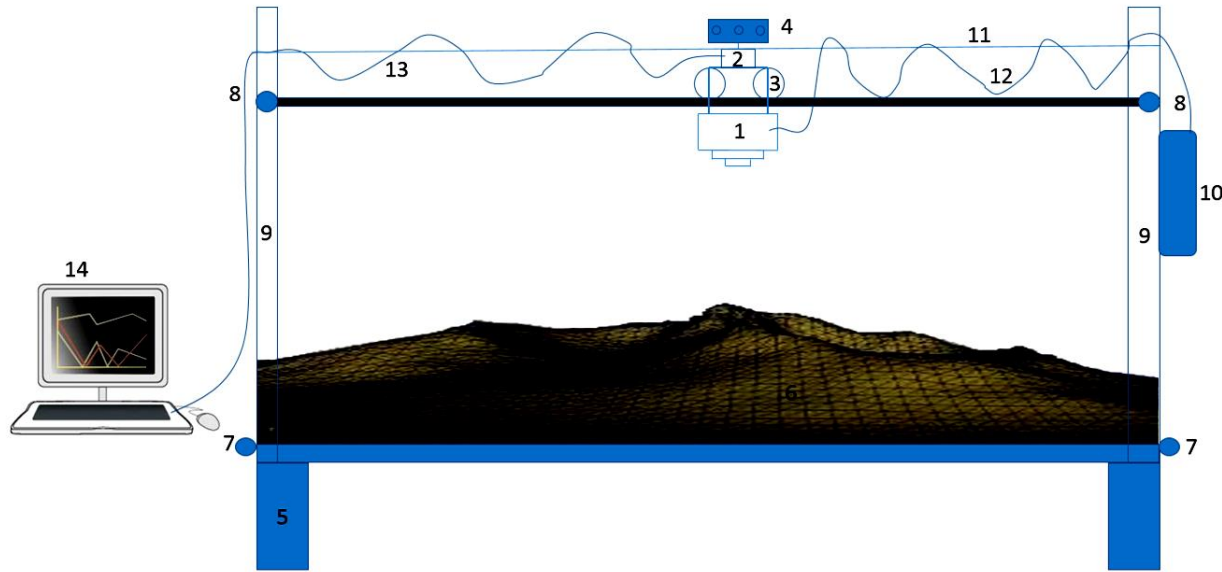


KEY TECHNOLOGIES OF PAG

1. Geographic Information Systems (*from simple GIS until Artificial Intelligence*);
2. Global Navigation Satellite Systems (*NAVSTAR, GLONASS, GALILEO & etc.*);
3. Remote Sensing (*Space, Aerial, Ground*);
4. Yield monitoring system (*Detection of crop problems, Weather forecasting & etc.*);
5. Soil testing system (*Nutrients, Moisture, Electrical Conductivity, Soil Compaction*);
6. Web technologies (*Agro SDI, Geo-portals, Geo-services, Geo-analytical systems*);
7. Internet of Things (IoT);
8. Blockchain;
9. Big Data;
10. Land management;
11. Crop Management system (*Irrigation, Precision Spraying, Crop protection, Fertilizing, Planning, Applying Crop Production Technologies, Year-end Assessment*);
12. Variable Rate Technology (*VRT - Map-based, Sensor-based*);
13. Sensors (*for: Soil, Plant, Pest, Pressure, Flow, Speed & etc*);
14. Livestock farming;
15. On Farm Research (OFR);
16. Smart;
17. Intellectual;
18. Artificial Intelligence;
19. Robotics & etc.

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Model of Educational System for PAg (by Yermekov F. and et al., 2019)



1 - digital camera; 2 - inclinometer Nivel210 / Nivel220; 3 - rollers of longitudinal movement; 4 - mark for the removal of coordinates; 5 - table; 6 - mock-up of the plot of land; 7 - rollers of lateral movement; 8 - moving rollers in height; 9 - metal racks; 10 - the control panel of the camera; 11 - a cable for movement of cables; 12 - cable for connecting the camera with the console; 13 - RS232 cable; 14 - processor for data storage.

Suggestion

**We propose
to complete our project
with a modern Precision Agriculture
textbook,
which covers the main problems of
Integrated Crop and Livestock Systems**

The Structure of Textbook (Chapters)

1. ТЕНДЕНЦИИ, ПОНЯТИЯ И АСПЕКТЫ ТСХ
2. ГЕТЕРОГЕННОСТЬ ПОЧВ, ПОСЕВОВ И ЖИВОТНЫХ
3. НАУЧНО-ТЕХНИЧЕСКИЕ ОСНОВЫ ТСХ
 - 3.1 Радионавигационные системы
 - 3.2 Геоинформационные системы
 - 3.3 Дистанционное зондирование Земли
 - 3.4 Веб-технологии
 - 3.5 Практический опыт и знания экспертов
4. ТЕХНИКА ДЛЯ ТСХ
5. ТЕХНОЛОГИЧЕСКИЕ ПОДХОДЫ и ТИПЫ ТЕХНОЛОГИИ
7. СЕНСОРИКА
8. ТОЧНОЕ ЖИВОТНОВОДСТВО и ЕГО СИСТЕМНЫЕ ОСНОВЫ
9. ОПЫТНОЕ ДЕЛО ДЛЯ ТСХ
10. СТРАТЕГИИ РЕАЛИЗАЦИИ ТСХ
11. ЭКОНОМИЧЕСКИЕ АСПЕКТЫ ТСХ
12. РАЗРАБОТКА СИСТЕМЫ ТСХ НА ПРИМЕРЕ АГРОФИРМЫ

The Structure of Textbook (Chapters)

- 1. TRENDS, CONCEPTS AND ASPECTS OF PAg.**
- 2. HETEROGENEITY OF SOILS, CROPS AND ANIMALS.**
- 3. SCIENTIFIC AND TECHNICAL BASES OF PAg.**
 - 3.1 Radio navigation systems**
 - 3.2 Geographic Information Systems**
 - 3.3 Remote Sensing**
 - 3.4 Web technologies**
 - 3.5 Practical experience and expert knowledge**
- 4. MACHINERY SYSTEMS FOR PAg.**
- 5. TECHNOLOGICAL APPROACHES AND TYPES OF TECHNOLOGY**
- 7. SENSORS**
- 8. PRECISE ANIMAL Husbandry AND IT'S SYSTEM BASES**
- 9. Technique FOR PAg**
- 10. PAg IMPLEMENTATION STRATEGIES**
- 11. ECONOMIC ASPECTS OF PAg**
- 12. DEVELOPMENT OF THE PAg SYSTEM ON THE EXAMPLE OF AGRI FIRM**

Suggestion

We're expect from our colloquies decision of next topics:

- Feed quality management
- Sensor technology in animal husbandry
- Environmental effects of precision livestock farming
- Automation in livestock farming
- Implementation, education and training



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Thank you for your attention!



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