中國農業大學
China Agricultural University

CAU & COE IN BRIEF

Lujia Han, PhD
Dean and Prof. of the College of Engineering
China Agricultural University (CAU)

OUTLINE

- About CAU & COE
- Research Priority
- Cooperation Opportunities

1. About CAU & COE

- History can be dated back to 1905, when the College of Agriculture was founded by the Qing Dynasty
- One of the top ranked key state universities in China
- A leading agricultural education and research institution in China
- Directly subordinated to the Ministry of Education

COLLEGE & SCHOOL

中国農業大學 China Agricultural University

West campus

- Agronomy
- Horticulture
- Plant Protection
- Animal Science and Technology
- Veterinary Medicine
- Biological Science
- Natural Resources and Environmental Sciences
- School of Continuing Education

East campus

- Economics and Management
- Food Science and Nutrition Engineering
- **Engineering**
- Informatics and Electrical Engineering
- Water Conservancy and Civil Engineering
- Humanities and Development
- Natural Science
- International College of Beijing

DISCIPLINES RANKING

中国農業大學
China Agricultural University

- **Top ranked national key disciplines**
  - Agricultural Engineering
  - Crop Science
  - Plant Protection
  - Agricultural Resources & Environment
  - Animal Husbandry
  - Veterinary Medicine

DISCIPLINES RANKING

中国农业大学
China Agricultural University

- **Top 1% of disciplines in the world by Essential Science Indicators (ESI)**
  - Agricultural Science
  - Plant and Animal Science
  - Biology and Biochemistry
  - Environmental Science
  - Chemistry
  - Microbiology
  - Engineering

National Ranking: Agricultural Engineering

- ***2010-2012***

10019	**China Agricultural University**	**96**
10335	Zhejiang University	85
10183	Jilin University	83
10712	Northwest Agri.& Forestry S&T University	
10299	Jiangsu University	79
10564	South China Agricultural University	
10224	Northeast China Agricultural University	75
10129	Inner Mongolia Agricultural University	73
10466	Henan Agricultural University	
10157	Shenyang Agricultural University	72
10294	Hehai University	
10307	Nanjing Agricultural University	70
10434	Shandong Agricultural University	
10504	Huazhong Agricultural University	

http://www.cdgdc.edu.cn/xwyyjsjyxx/xxsbdxz/mtjjp/index.shtml

National Ranking: *Agricultural Engineering*

中国農業大學 China Agricultural University

- ***2007-2009***

University	Level	
	Ranking	Score
10019 China Agricultural University	**1**	**99**
10183 Jilin University	2	87
10712 Northwest Agri.& Forestry S&T University	3	85
10335 Zhejjiang University	4	84
10564 South China Agricultural University	5	77
10224 Northeast China Agricultural University	6	73
10299 Jiangsu University	7	72
10129 Inner Mongolia Agricultural University	8	69
10294 Hehai University	9	67
10610 Sichuan University		
10466 Henan Agricultural University	11	66
10635 Southwest University	12	64
10298 Nanjing Forestry University	13	61
10435 Qingdao Agricultural University		

http://www.chinadegrees.cn/xwyyjsjyxx/zlpj/xksppm/

Collaborative Education Program

中國農業大學 China Agricultural University

- **2+2** Undergraduate Transfer Program
  - *Agricultural Engineering at CAU, China*
  - *ABE at Purdue University, USA*
  - *Dual BSc. Degree*

Collaborative Education Program

中国農業大學 China Agricultural University

CSC innovative talent international cooperation development project

- **China-US 100 Environment & Energy PhD Program**
  - *COE, China Agricultural University*
  - *University of Tennessee/Oak Ridge National Lab*
- **Dual Masters Degree Program in Applied Mechatronic Engineering**
  - *COE, China Agricultural University*
  - *Harper Adams University, UK*

Key Research Institution in COE

- Key Laboratory for ***Soil-Machine-Plant Systematic Technology***, the Ministry of Agriculture;
- Key Laboratory of ***Clean Production and Utilization of Renewable Energy***, the Ministry of Agriculture;
- ***Conservation Tillage*** Research Center, the Ministry of Agriculture;
- Scientific Observing and Experimental Station for ***Arable Land Conservation*** (North Hebei), the Ministry of Agriculture;
- National R&D Branch Center for ***Agro-processing Equipment***, the Ministry of Agriculture;

Key Research Institution in COE

中国农业大学 China Agricultural University

- Engineering Research Center for ***Agricultural Equipment and Facilities***, the Ministry of Education;
- Key Laboratory for ***Modern Agricultural Equipment Design***, the Beijing Municipality;
- ***Agricultural Engineering Academy***, CAU;
- ***Biomass Engineering*** Center, CAU;
- Strategy Research Center for China ***Agricultural Mechanization Development***, CAU

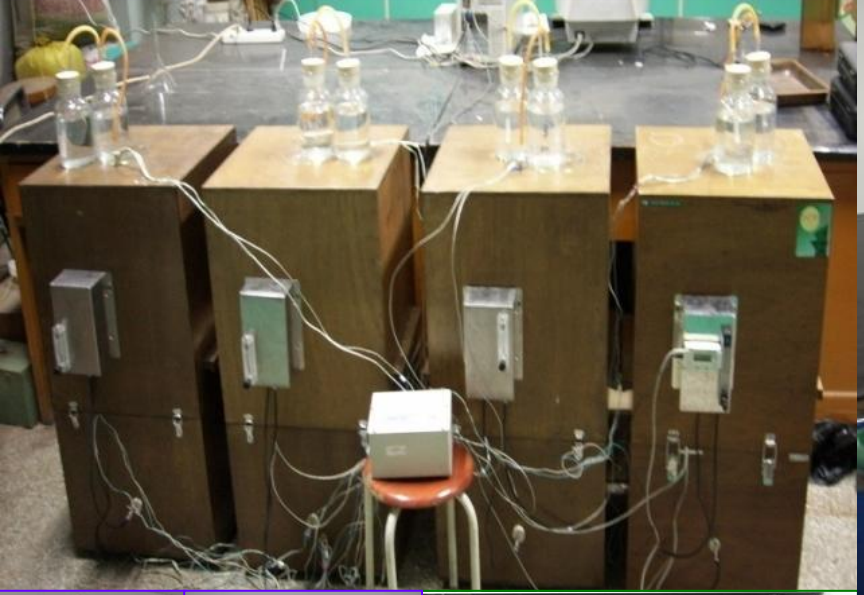
Practical Teaching Center in COE

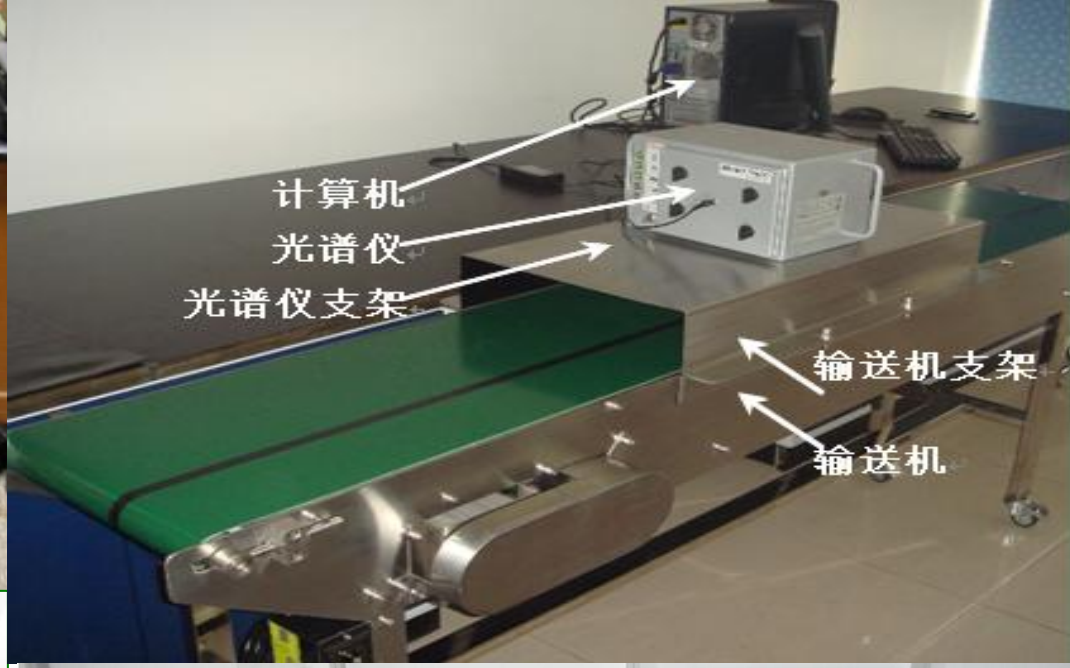
中国农业大学 China Agricultural University

- **National Experimental Teaching Demonstrating Center** for *Mechanical and Agricultural Engineering*, MoE
- **National Virtual Experimental Teaching Center** for *Mechanical and Agricultural Engineering*, MoE
- *Beijing Practical Innovation Base for Engineering Majors*, Beijing Municipality
- *Mechanical Engineering Practical Training Center*, CAU
- *Innovation Center for Undergraduate Students*, COE

Lab of Agro-material analysis

Lab of Agro-material analysis

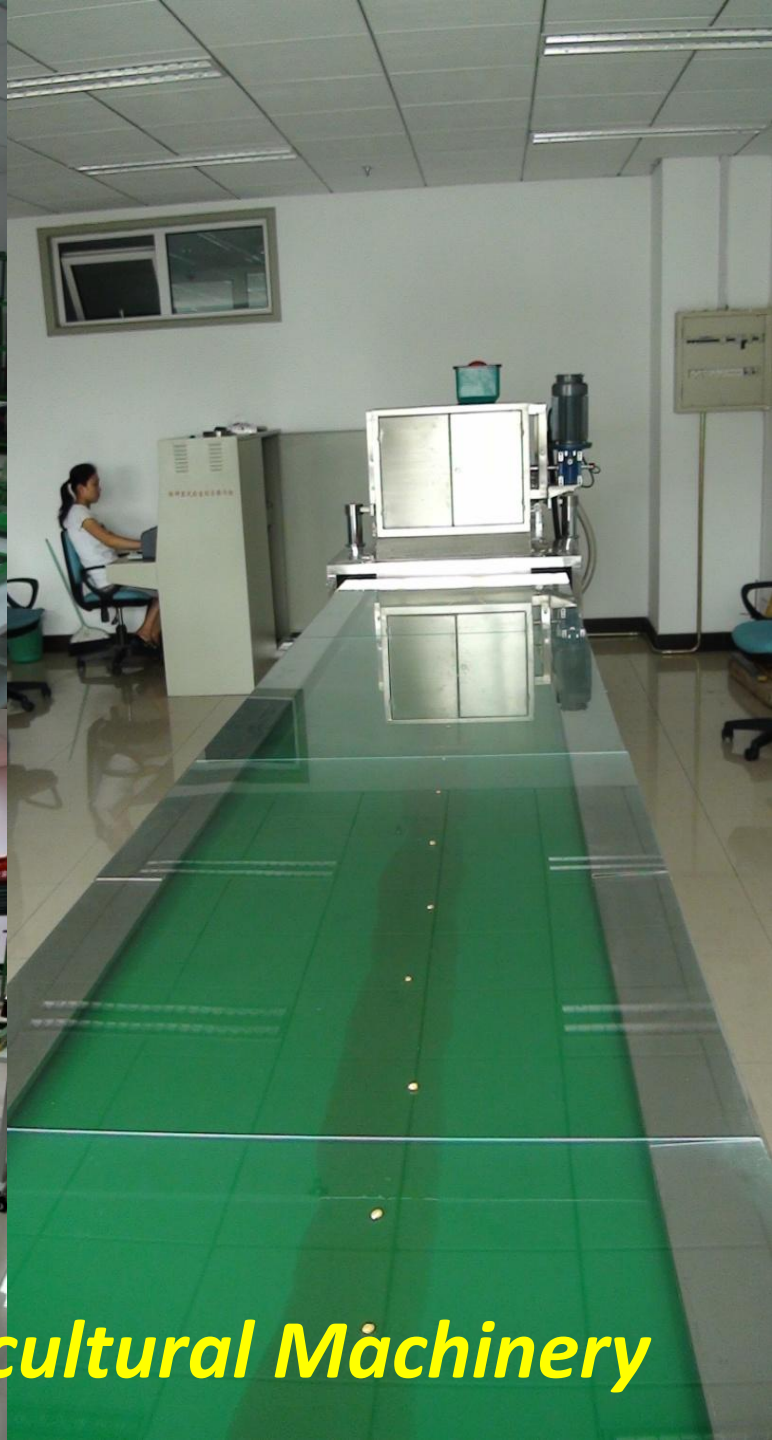




Lab of Agro-material analysis

中国农业大学工学院 智能型土壤-机器-植物系统实验室
Lab of Soil-Machine-Plant System
No Signal
No Signal
中国农业大学工学院 智能型土壤-机器-植物系统实验室

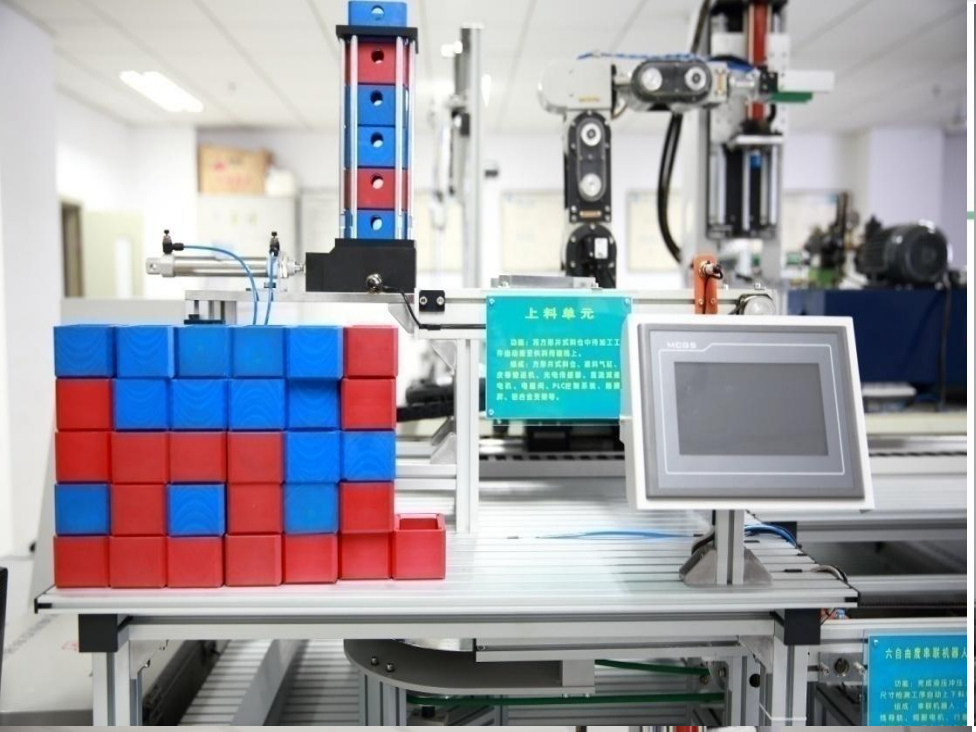
Lab of Drying Technology

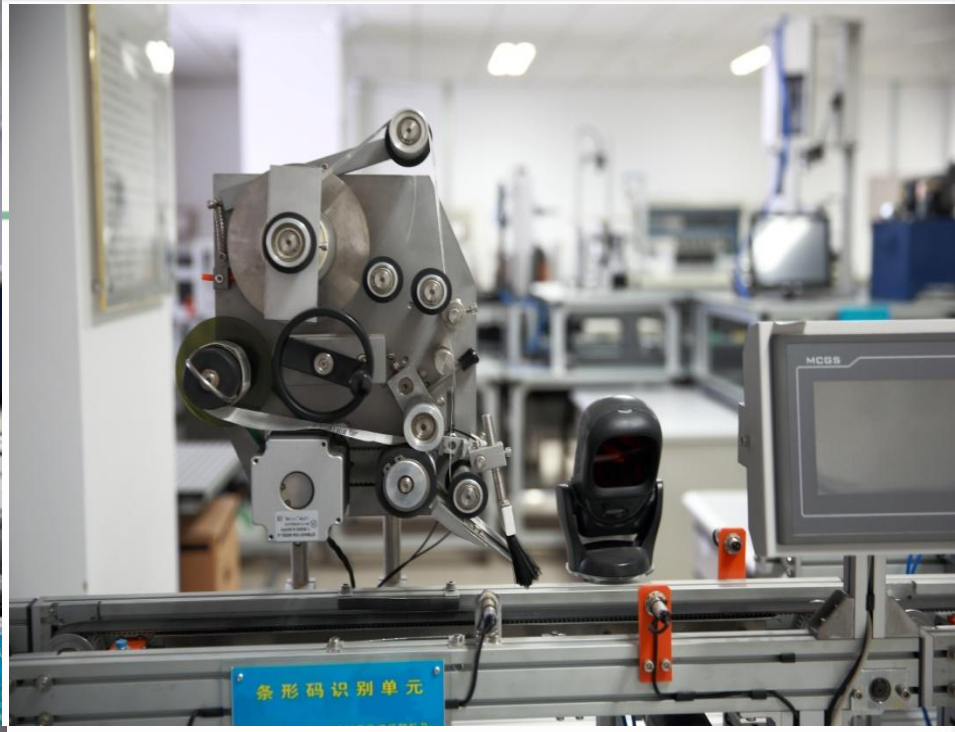


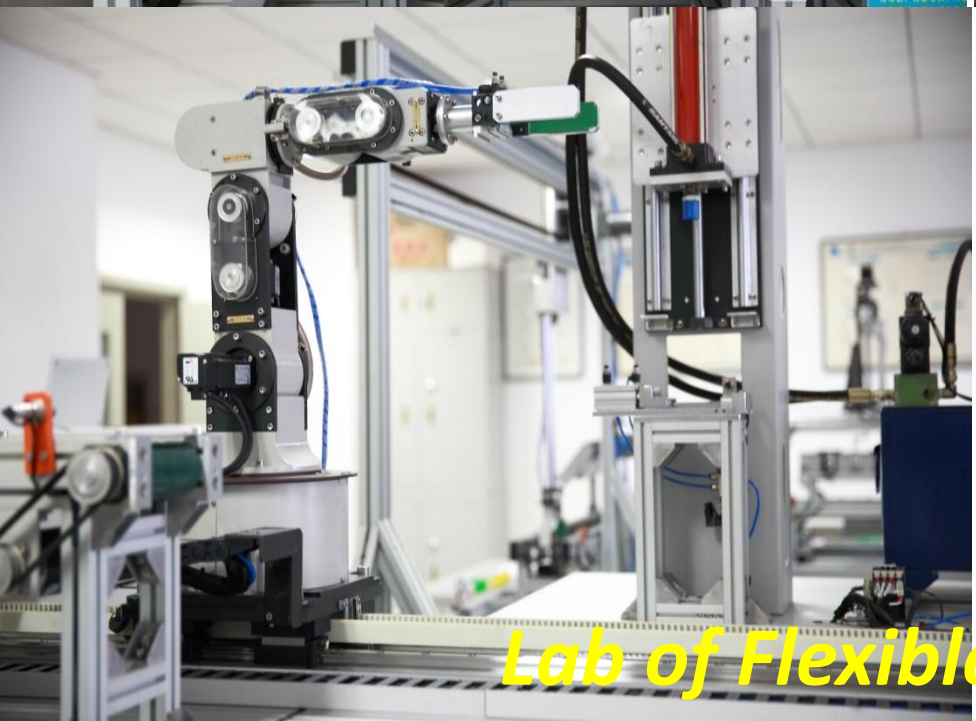
Lab of Agricultural Machinery

Labs of Vehicle Engineering

Labs of Measurement & Control







Lab of Flexible Manufacturing System

Lab of Anthropomorpic Robot

Lab of Digital Design & Virtual Reality

Mechanical Engineering Training Center

Mechanical Engineering Training Center

2. Research Priority

Machine System & Agricultural Mechanization

- Soil-Machine-Plant System
- Development Strategy for Agricultural Mechanization
- Conservation Tillage
- Precision Farming

Agricultural Machinery

- Farm Machine
- Off-Road Vehicle
- Agricultural Robots and Intelligent Equipment
- Measurement and Control Technology for Agricultural Equipment

2. Research Priority

Digital Design & Virtual Reality

- Virtual Reality & Simulation
- Ergonomics Design
- Industrial Design

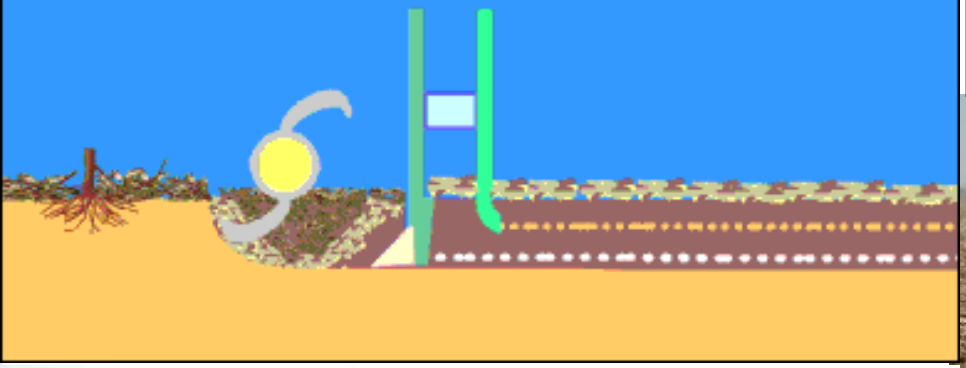
Agro Product Processing

- Drying Technology and Machinery
- Feed & Forage Processing
- Fruit and Vegetable Processing
- Nondestructive Detection and Machine Vision

Agricultural Biomass Engineering

- Biomass Material Properties Characterization
- Bio-processing for Value Added Products
- Biogas & Bio-based Energy

Strip Rotary Hoe to Make a Narrow Cleaning Zone

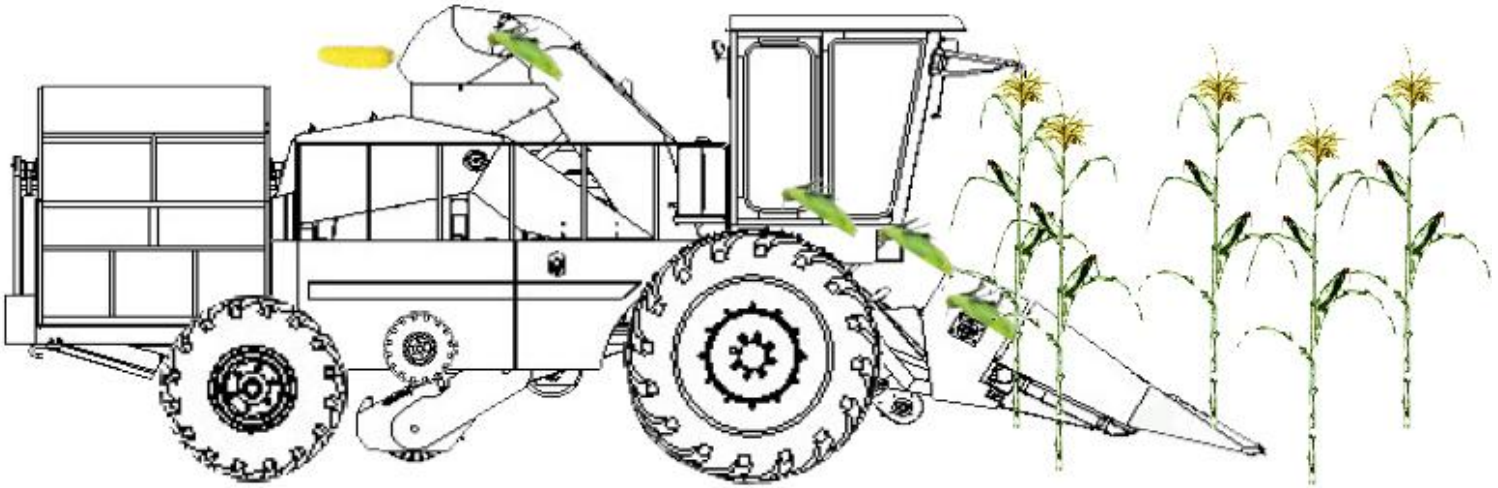


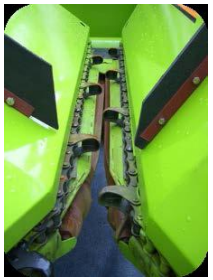
Conservation Tillage

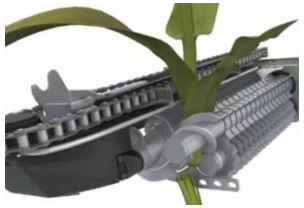
-- Lead by Dr HW Li

Mechanized Maize Production--Lead by Dr DX Zhang

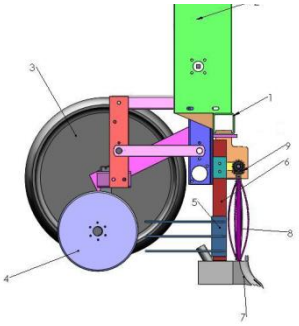
Technical mode for Corn Harvesting

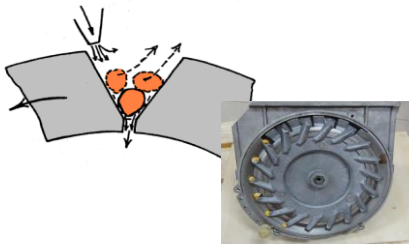


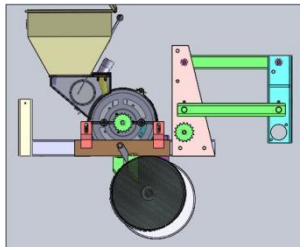


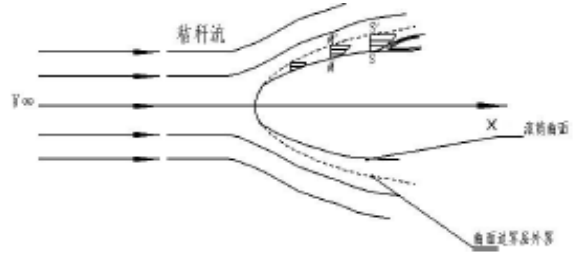


Key components design for a precision planter

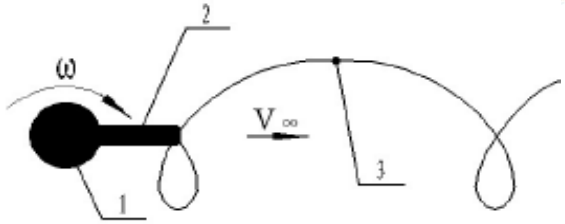








$$\left.\begin{aligned} v_r &= \frac{\partial \varphi}{\partial r} = v_\infty\left(1-\frac{r_0^2}{r^2}\right)\cos\theta \\ v_\theta &= \frac{\partial \varphi}{r\partial \theta} = -\left(1+\frac{r_0^2}{r^2}\right)\sin\theta - \frac{\Gamma}{2\pi r} \end{aligned}\right\}$$

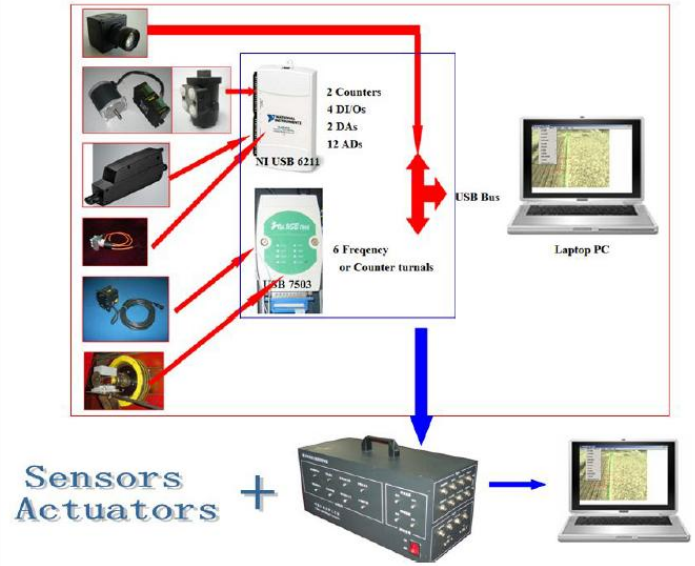


VISION AIDS TO NAVIGATION OF AGRICULTURAL MACHINE

Sensors and actuators of the navigation platform

Research contents:

- *Design of visual navigation controller for Agricultural Machine*
- *Study on navigation line detection arithmetic : histogram fusion algorithm*
- *Obstacle recognition and interference sources identification*

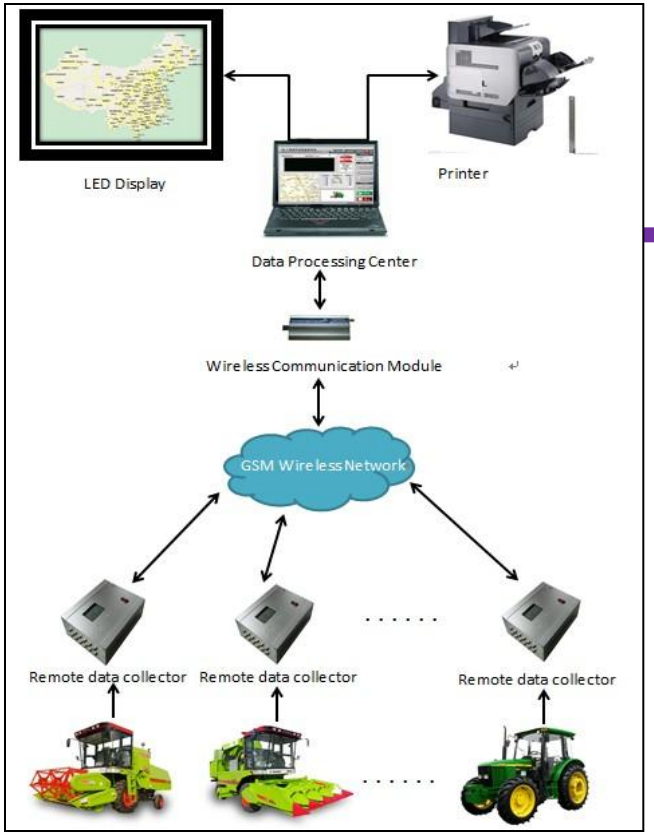


Hardware control system of the vision navigation platform

Field navigation line detection results using rotation and projection arithmetic

-- Lead by Dr SM Wang

Wireless Agricultural Machinery Monitoring Network

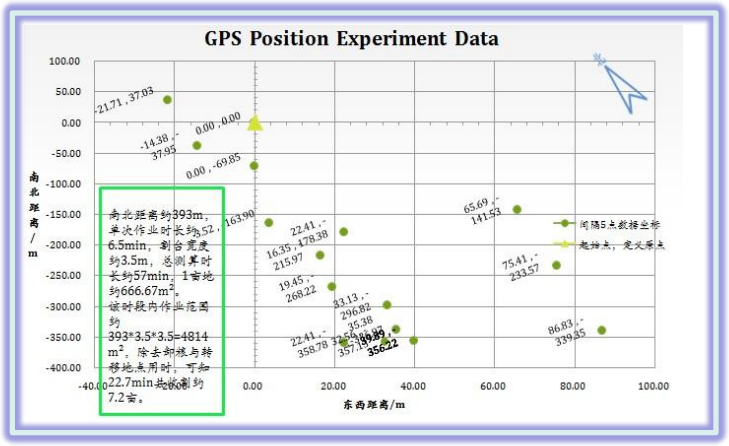


Agricultural Machinery Sensors Network

Research contents:

- Remote Agricultural Machinery Data Logger
- Wireless sensors network
- Codeless Data Acquisition and Analysis Software

Codeless Data Acquisition and Analysis Software

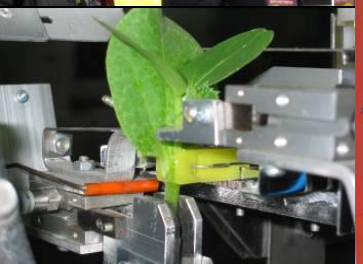


- This monitoring software develops a geographic information system based **on Lab Windows/ DVI** software platform. This software achieves **the real-time location** display of the engineering machinery on the electronic map. It can also inquire the information of engineering machinery.

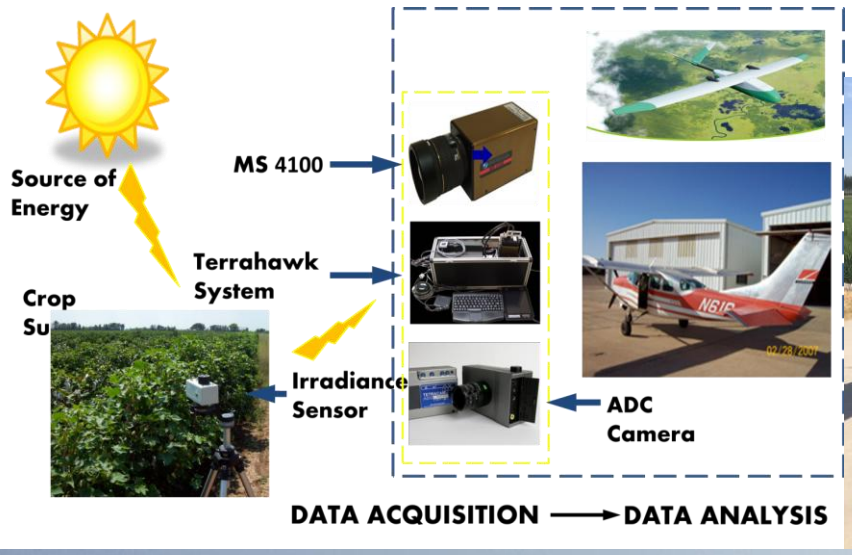
Lead by Dr SM Wang

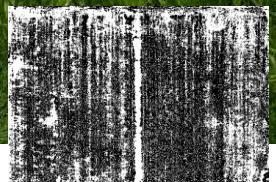
Fruit Juice Processing– Lead by Prof. SY Zhang

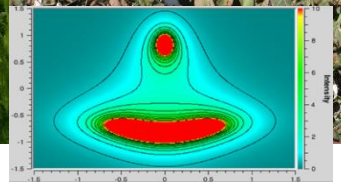
Agricultural Robot – *Lead by Prof. TZ Zhang &W Li*

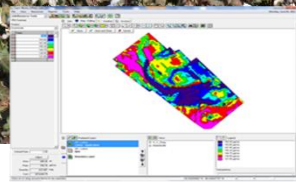


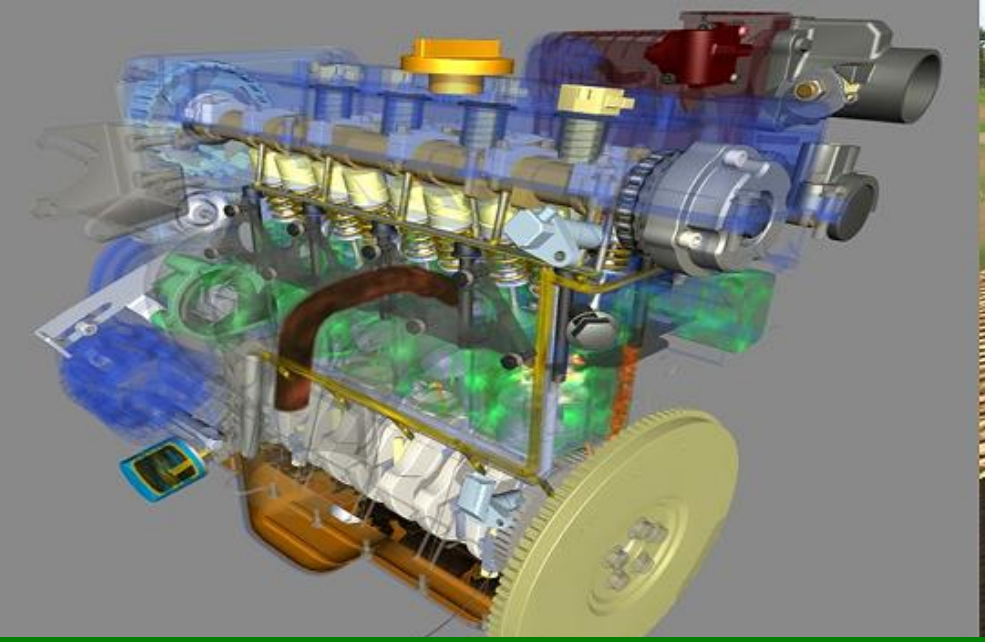
UMV in agriculture – *Lead by Dr. YJ Zhen*











Digital Design & Virtual Reality – *Lead by Prof. ER Mao & ZH Song*

9265A 自走式青饲料收获机
Self-propelled Forage Harvester's Wrapper

Details Design 细节设计

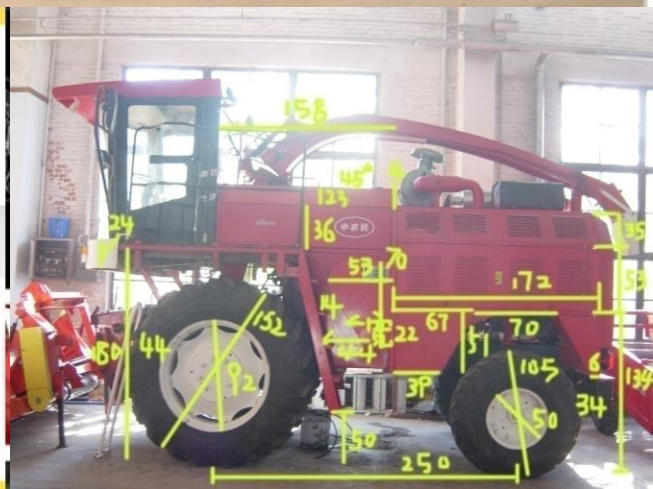
统一又具差异性的左右车身两侧;
Similiar but different body sides;

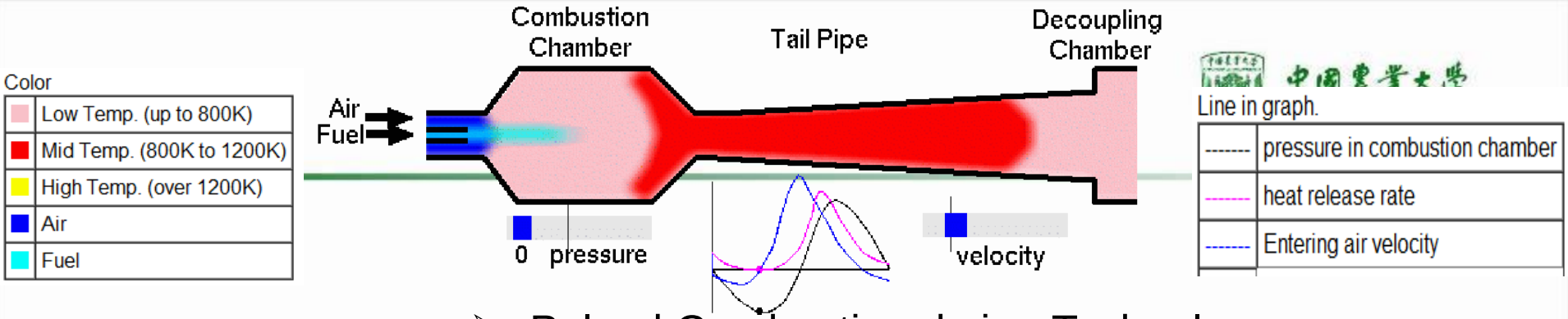
驾驶空间合理，视野开阔，驾驶舒适;
Suitable driving seat with wide view and comfortable operation.

符合人体尺度的楼梯，带有加宽的第一阶，配有辅助扶手，阶面有防滑肌理;
Ergonomic stairs with a deliberately widened first stair tread and auxiliary handrails;the surface of stairs with stripe-shape surface;

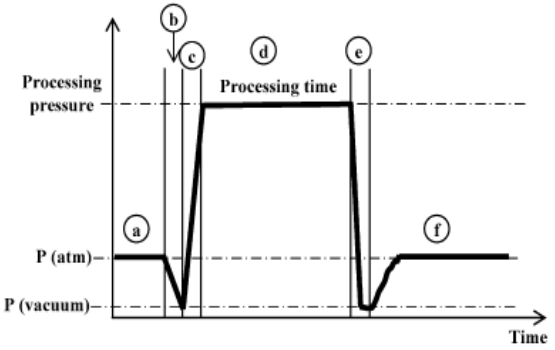
尾灯向两侧外移，避免被摆动拖车撞坏;
Rear Lamps move outward to edges to avoid the collision position of the trailer's swing;

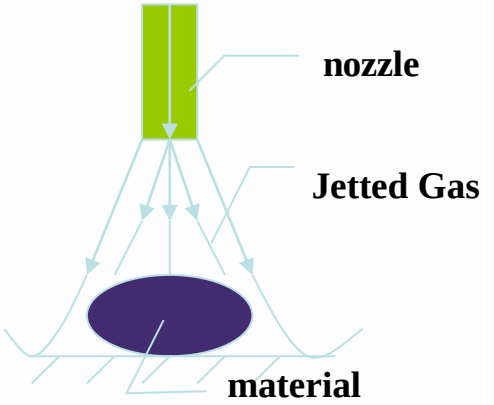
Industry Design
—Lead by Dr S Liu





➢ Pulsed Combustion drying Technology





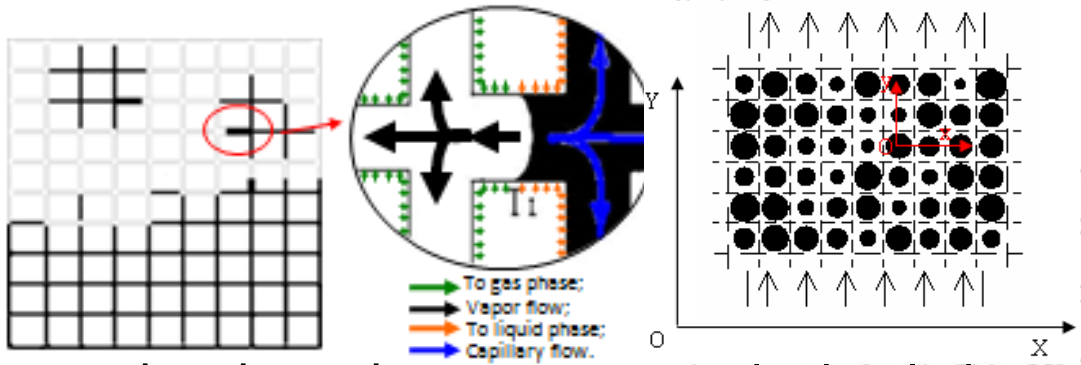
➢Pulsed Vacuum Drying and Osmosis Technology

➢ Air Impingment Drying Technology

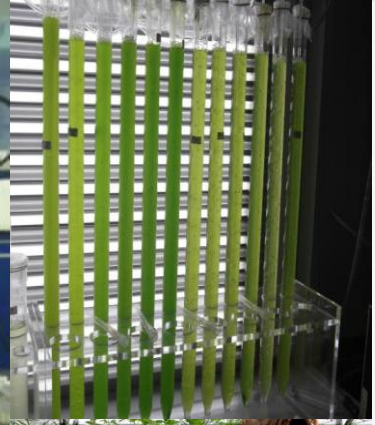
Drying Technology

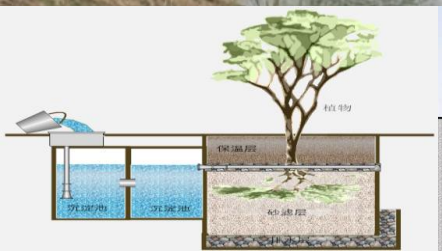
-- Lead by Dr XD Liu,

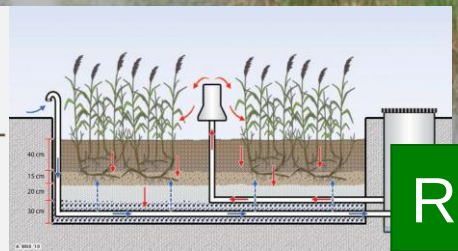
Dr ZJ Gao et al



➢Drying model of agro-product based on pore network simulation



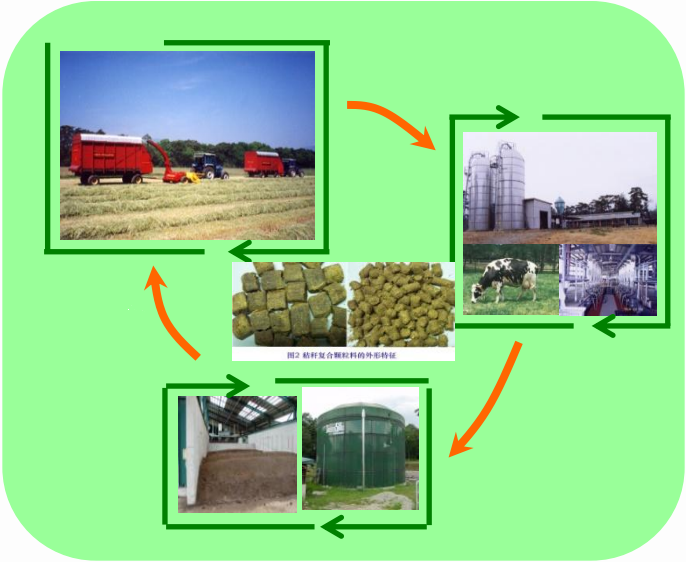




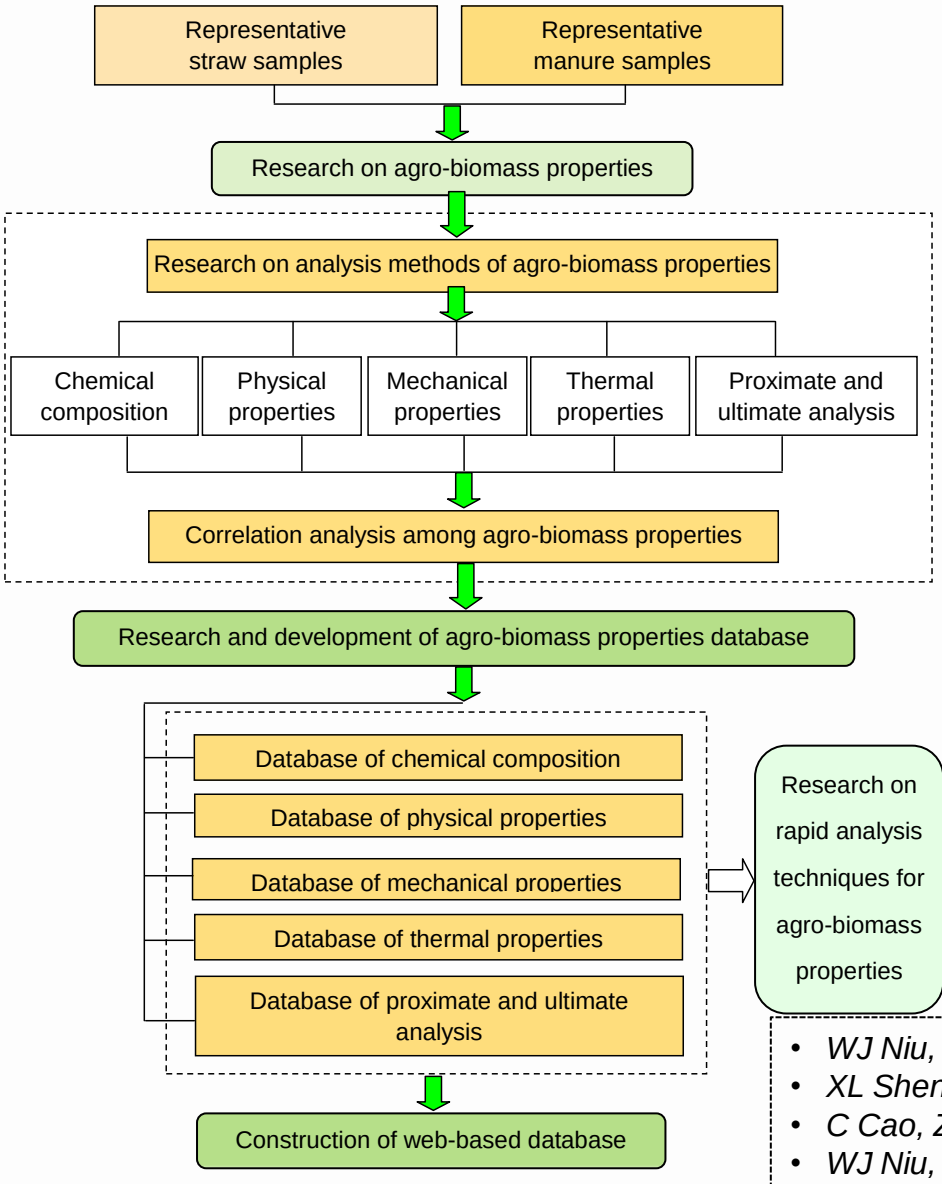
Renewable Energy—*Lead by Prof. RJ Dong*

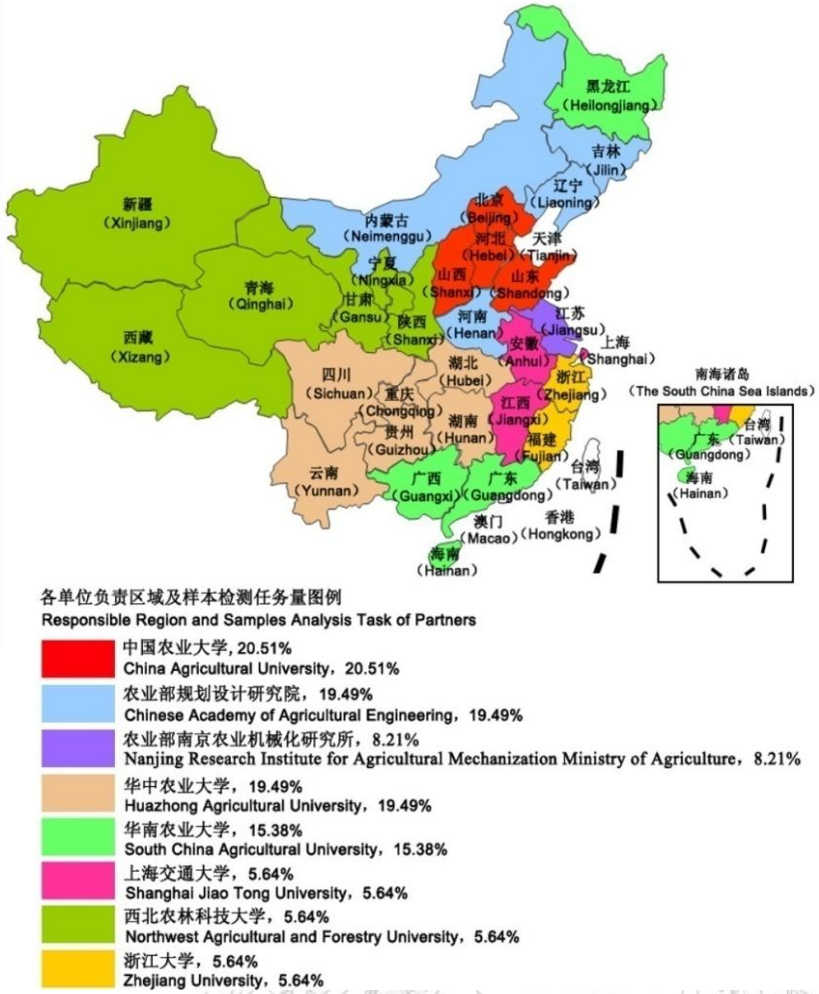
Straw processing for ruminant feed

中國農業大學
China Agricultural University

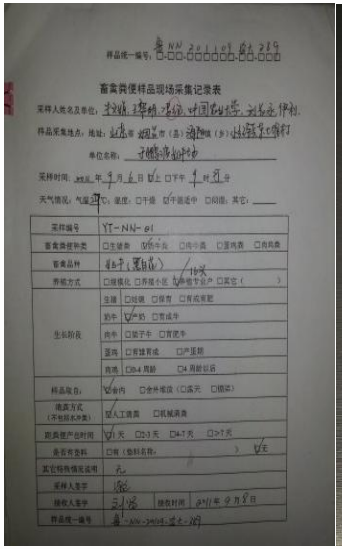


Characterization of Biomass Feedstock

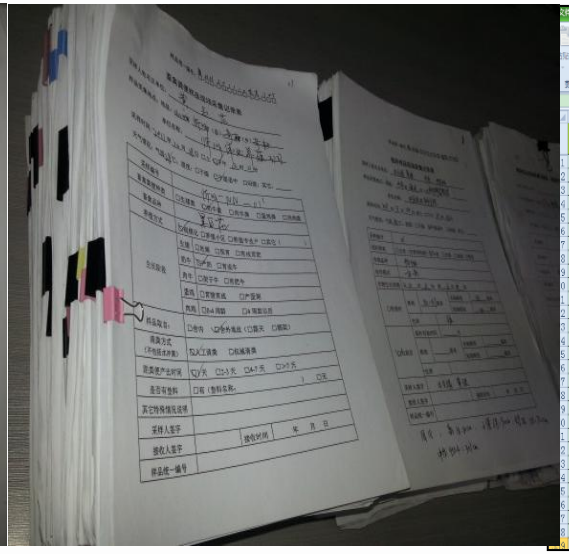


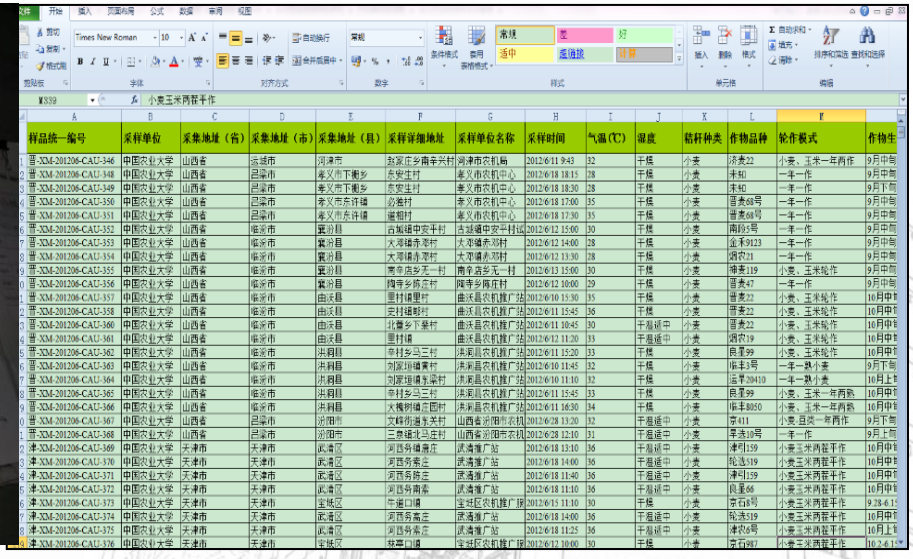


- *WJ Niu, LJ Han*, X Liu, GQ Huang, LJ Chen.* ***Energy****, 2016；*
- *XL Shen, GQ Huang, ZL Yang, LJ Han*.* ***Applied Energy****, 2015;*
- *C Cao, ZL Yang*, LJ Han.* ***Cellulose****, 2015;*
- *WJ Niu, GQ Huang, X Liu, LJ Chen, LJ Han*.* ***Energy & Fuels****, 2014.*



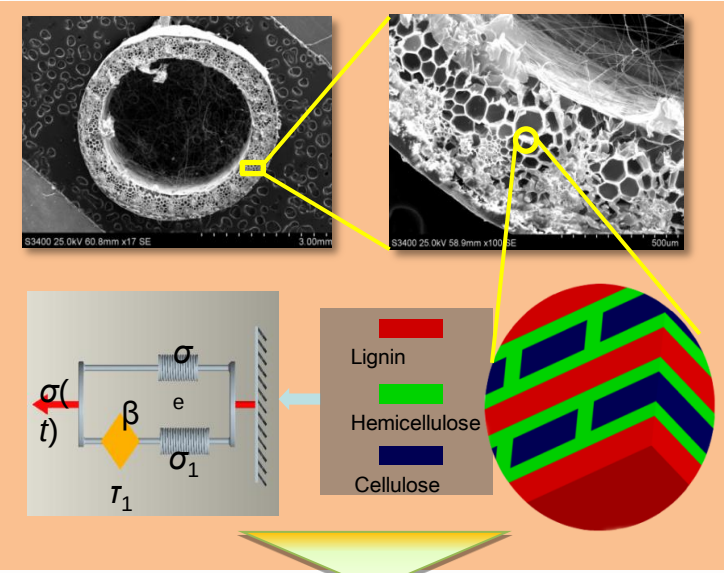
畜禽粪便样品现场采集记录表

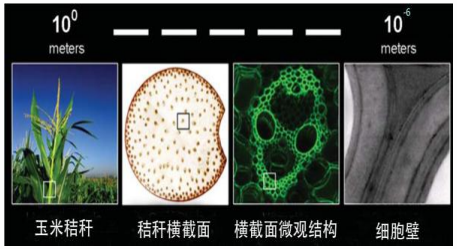


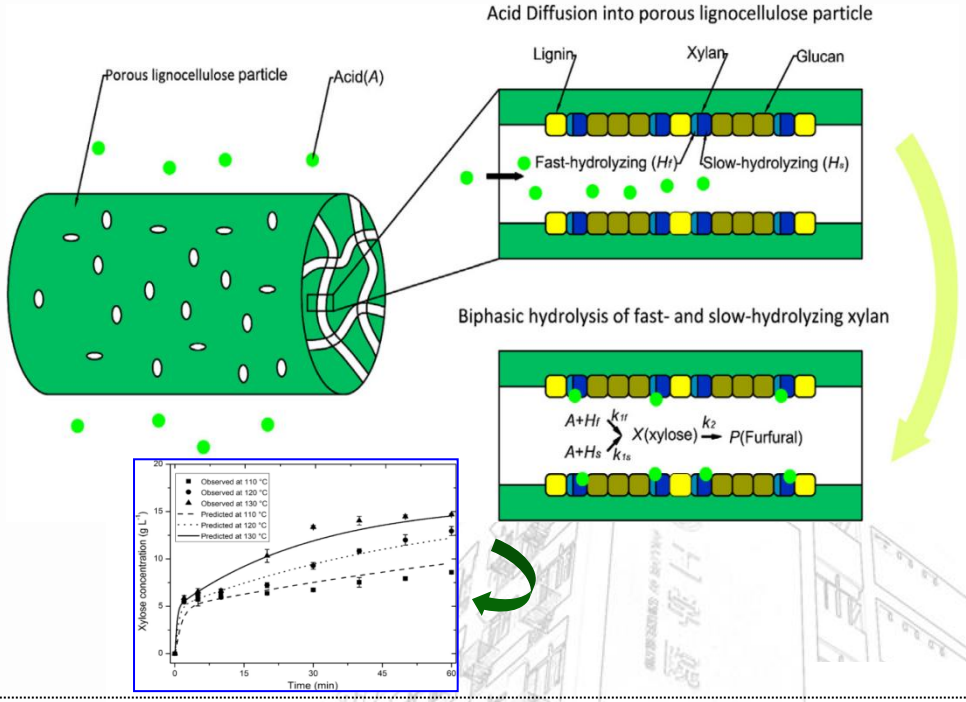


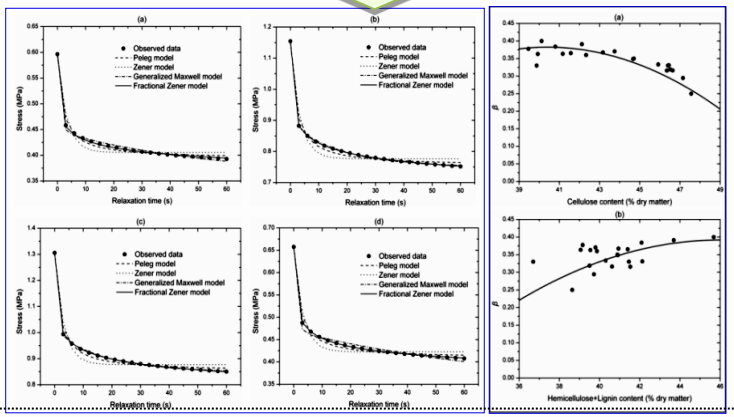
样品统一编号	采样单位	采集地址（省）	采集地址（市）	采集地址（县）	采样详细地址	采样单位名称	采样时间	气温(℃)	湿度	秸秆种类	作物品种	轮作模式	作物生
晋-XM-201206-CAU-346	中国农业大学	山西省	运城市	河津市	赵家庄乡南辛兴村	河津市农机局	2012/6/11 9:43	32	干燥	小麦	济麦22	小麦、玉米一年两作	9月中旬
晋-XM-201206-CAU-348	中国农业大学	山西省	吕梁市	孝义市下栅乡	东史生村	孝义市农机中心	2012/6/18 18:15	28	干燥	小麦	丰知	一年一作	9月中旬
晋-XM-201206-CAU-349	中国农业大学	山西省	吕梁市	孝义市下栅乡	东史生村	孝义市农机中心	2012/6/18 18:30	28	干燥	小麦	丰知	一年一作	9月下旬
晋-XM-201206-CAU-350	中国农业大学	山西省	吕梁市	孝义市东许镇	必装村	孝义市农机中心	2012/6/18 17:00	35	干燥	小麦	晋麦68号	一年一作	9月中旬
晋-XM-201206-CAU-351	中国农业大学	山西省	吕梁市	孝义市东许镇	崔相村	孝义市农机中心	2012/6/18 17:30	35	干燥	小麦	晋麦68号	一年一作	9月中旬
晋-XM-201206-CAU-352	中国农业大学	山西省	临汾市	翼城县	古城镇中安平村	古城镇中安平村证	2012/6/12 15:00	30	干燥	小麦	南农9号	一年一作	9月中旬
晋-XM-201206-CAU-353	中国农业大学	山西省	临汾市	翼城县	大唐镇赤邓村	大唐镇赤邓村	2012/6/12 14:00	28	干燥	小麦	金禾9123	一年一作	9月中旬
晋-XM-201206-CAU-354	中国农业大学	山西省	临汾市	翼城县	大唐镇赤邓村	大唐镇赤邓村	2012/6/12 13:30	28	干燥	小麦	烟农21	一年一作	9月中旬
晋-XM-201206-CAU-355	中国农业大学	山西省	临汾市	翼城县	南辛庄乡无一村	南辛庄乡无一村	2012/6/13 15:00	30	干燥	小麦	锦麦119	小麦、玉米轮作	9月中旬
晋-XM-201206-CAU-356	中国农业大学	山西省	临汾市	翼城县	隆寺乡陈庄村	隆寺乡陈庄村	2012/6/12 10:00	29	干燥	小麦	晋麦47	一年一作	9月中旬
晋-XM-201206-CAU-357	中国农业大学	山西省	临汾市	曲沃县	里村铺里村	曲沃县农机推广站	2012/6/10 15:30	35	干燥	小麦	锦麦22	小麦、玉米轮作	9月中旬
晋-XM-201206-CAU-358	中国农业大学	山西省	临汾市	曲沃县	史村铺村村	曲沃县农机推广站	2012/6/11 15:45	36	干燥	小麦	晋麦22	小麦、玉米轮作	10月中旬
晋-XM-201206-CAU-360	中国农业大学	山西省	临汾市	曲沃县	北董乡下裴村	曲沃县农机推广站	2012/6/11 10:45	30	干燥适中	小麦	晋麦22	小麦、玉米轮作	10月中旬
晋-XM-201206-CAU-361	中国农业大学	山西省	临汾市	曲沃县	里村镇	曲沃县农机推广站	2012/6/12 11:20	33	干燥适中	小麦	烟农19	小麦、玉米轮作	10月中旬
晋-XM-201206-CAU-362	中国农业大学	山西省	临汾市	洪洞县	辛村乡三二村	洪洞县农机推广站	2012/6/11 15:20	33	干燥	小麦	良星99	小麦、玉米轮作	10月中旬
晋-XM-201206-CAU-363	中国农业大学	山西省	临汾市	洪洞县	刘家垣镇贾村	洪洞县农机推广站	2012/6/10 11:45	32	干燥	小麦	临丰3号	一年一熟小麦	9月下旬
晋-XM-201206-CAU-364	中国农业大学	山西省	临汾市	洪洞县	刘家垣镇东梁村	洪洞县农机推广站	2012/6/10 11:10	32	干燥	小麦	温麦20410	一年一熟小麦	10月上旬
晋-XM-201206-CAU-365	中国农业大学	山西省	临汾市	洪洞县	辛村乡三二村	洪洞县农机推广站	2012/6/11 15:45	33	干燥	小麦	良星99	小麦、玉米一年两熟	10月中旬
晋-XM-201206-CAU-366	中国农业大学	山西省	临汾市	洪洞县	大槐树镇贡圆村	洪洞县农机推广站	2012/6/11 16:30	34	干燥	小麦	临丰8050	小麦、玉米一年两熟	10月中旬
晋-XM-201206-CAU-367	中国农业大学	山西省	吕梁市	汾阳市	文样街道东关村	山西省汾阳市农机	2012/6/28 13:20	32	干湿适中	小麦	晋411	小麦-豆类一年两作	9月下旬
晋-XM-201206-CAU-368	中国农业大学	山西省	吕梁市	汾阳市	三泉镇北马庄村	山西省汾阳市农机	2012/6/28 12:10	31	干湿适中	小麦	晋选10号	一年一作	9月上旬
津-XM-201206-CAU-369	中国农业大学	天津市	天津市	武清区	河西务镇南庄	武清潘厂站	2012/6/18 13:10	36	干燥适中	小麦	津研159	小麦玉米两茬平作	10月中旬
津-XM-201206-CAU-370	中国农业大学	天津市	天津市	武清区	河西务东走	武清潘厂站	2012/6/18 14:00	36	干燥适中	小麦	轮选519	小麦玉米两茬平作	10月中旬
津-XM-201206-CAU-371	中国农业大学	天津市	天津市	武清区	河西务防走	武清潘厂站	2012/6/18 11:40	36	干湿适中	小麦	津研159	小麦玉米两茬平作	10月中旬
津-XM-201206-CAU-372	中国农业大学	天津市	天津市	武清区	河西务南桑	武清潘厂站	2012/6/18 11:10	36	干湿适中	小麦	良星66	小麦玉米两茬平作	10月中旬
津-XM-201206-CAU-373	中国农业大学	天津市	天津市	宝坻区	牛道口镇	宝坻区农机推广所	2012/6/15 11:10	30	干燥	小麦	京石6号	小麦玉米两茬平作	9.28-6.15
津-XM-201206-CAU-374	中国农业大学	天津市	天津市	武清区	河西务高庄	武清潘厂站	2012/6/18 14:00	36	干湿适中	小麦	轮选519	小麦玉米两茬平作	10月中旬
津-XM-201206-CAU-375	中国农业大学	天津市	天津市	武清区	河西务东庄	武清潘厂站	2012/6/18 11:25	36	干湿适中	小麦	津农6号	小麦玉米两茬平作	10月上旬
津-XM-201206-CAU-376	中国农业大学	天津市	天津市	宝坻区	牛道口镇	宝坻区农机推广所	2012/6/12 10:00	30	干燥	小麦	京石987	小麦玉米两茬平作	10.2-6.15

Bio-behavior Modeling of Lignocelluloses



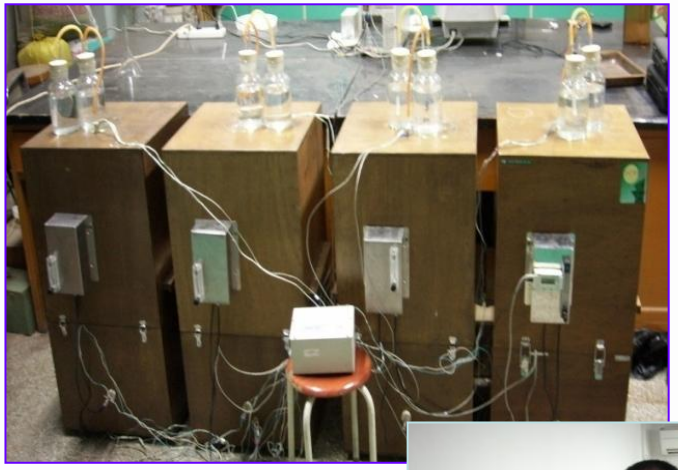






- *Longjian Chen, Haiyan Zhang, Junbao Li, Minsheng Lu, Xiaomiao Guo, Lujia Han*.* ***Bioresource Technology****, 2015;*
- *Longjian Chen, Aiwei Li, Xueqing He, Lujia Han*.* ***Carbohydrate Polymers****, 2015;*
- *Longjian Chen, Lujia Han*, Ouarda Saib, Guoping Lian.* ***Pharmaceutical research****, 2015;*
- *Longjian Chen, Na Liao Li Xing, Lujia Han*.* ***Agronomy Journal****, 2013;*
- *Longjian Chen, Li Xing, Lujia Han*.* ***Waste Management****, 2010.*

Composting of Agro-residues



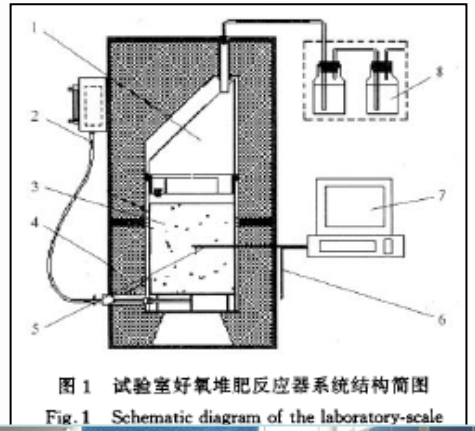
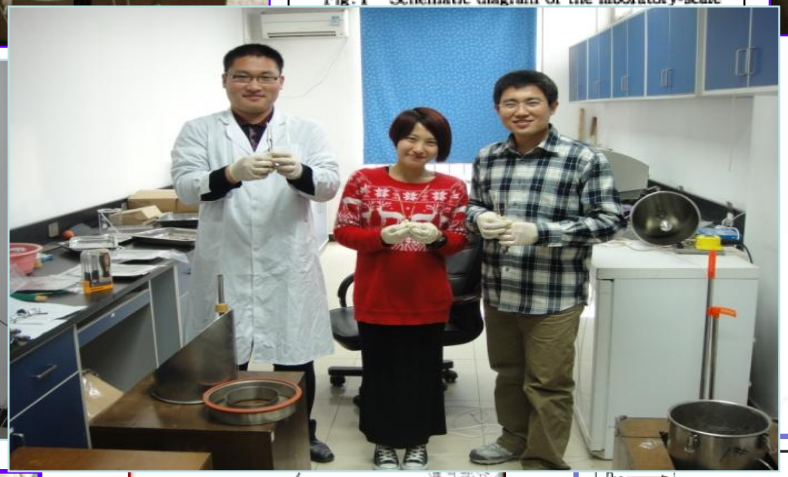
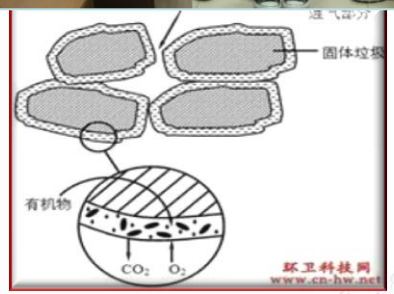
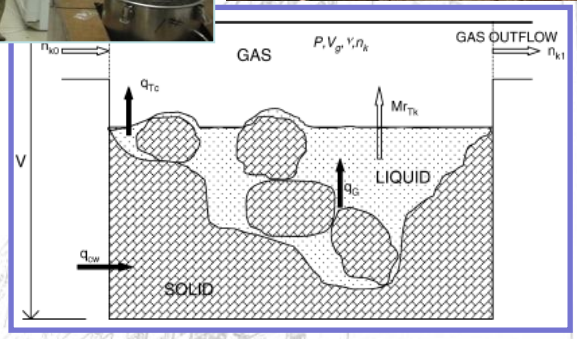


图 1　试验室好氧堆肥反应器系统结构简图

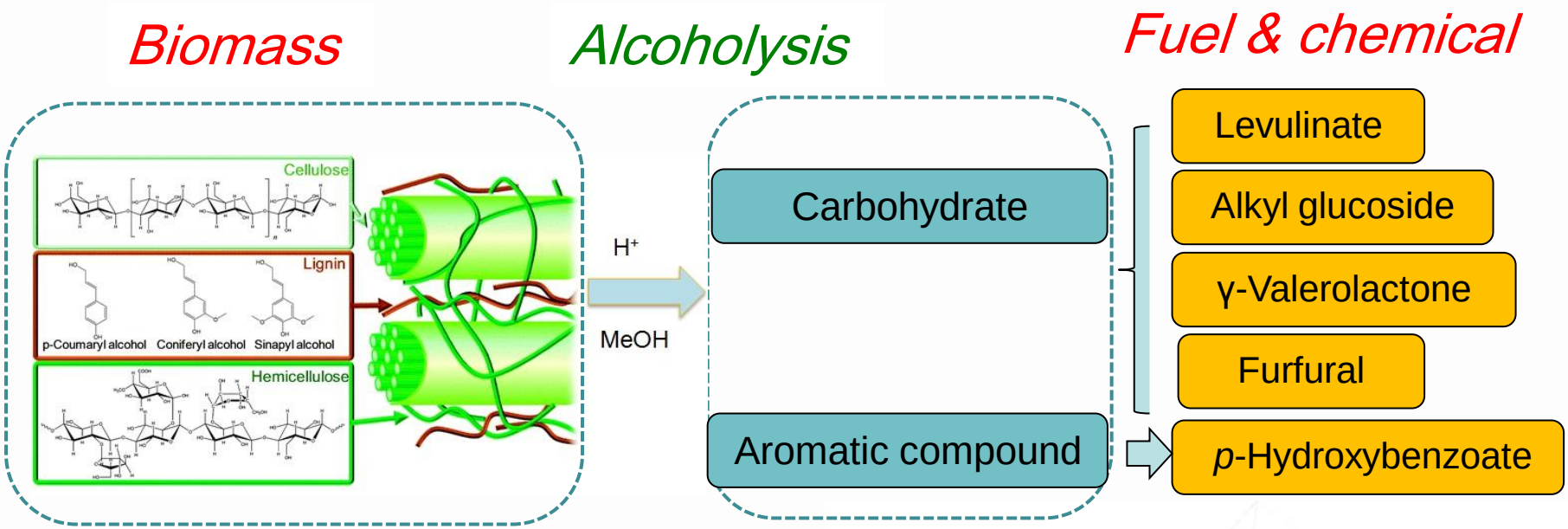
Fig. 1　Schematic diagram of the laboratory-scale

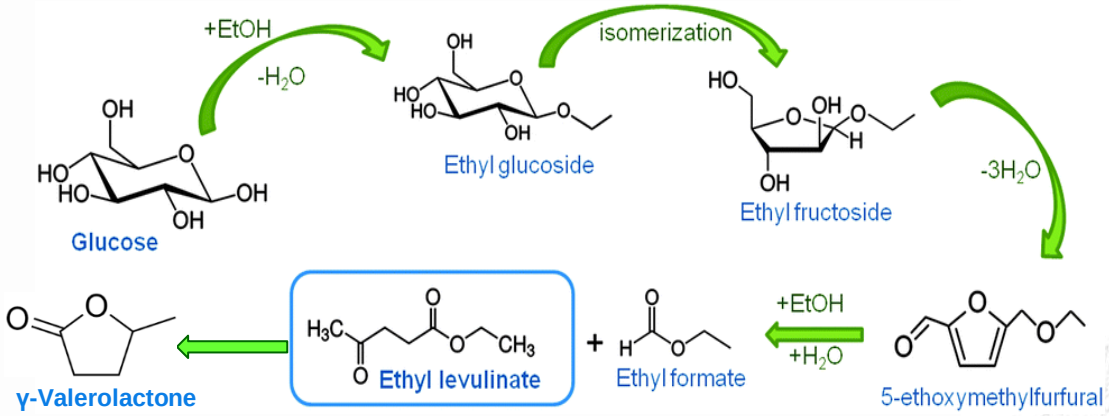






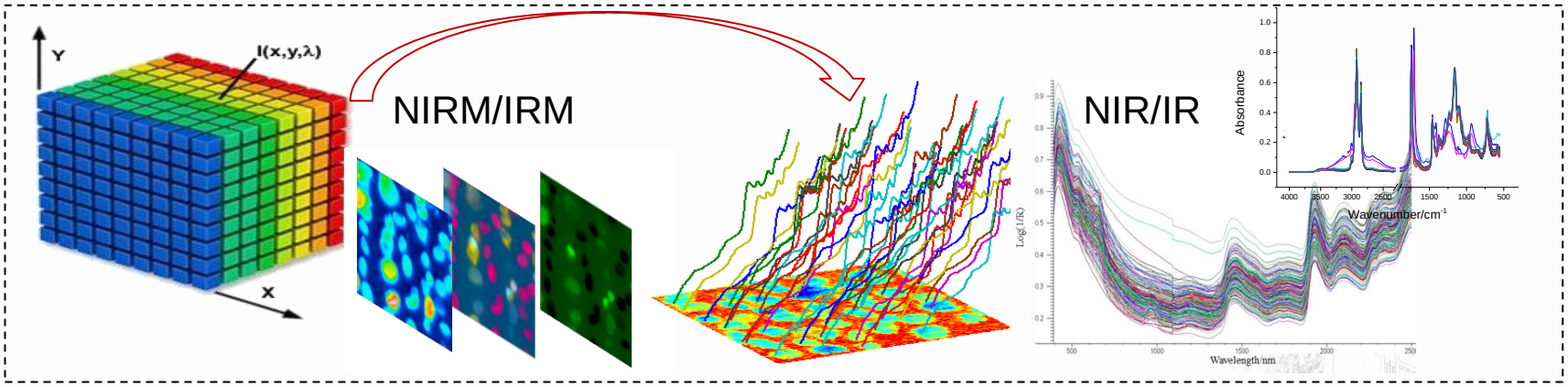
Bio-refining for Value Added Products

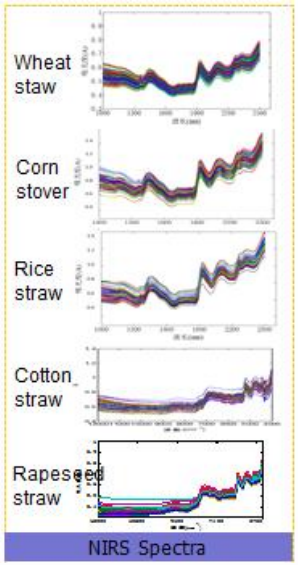


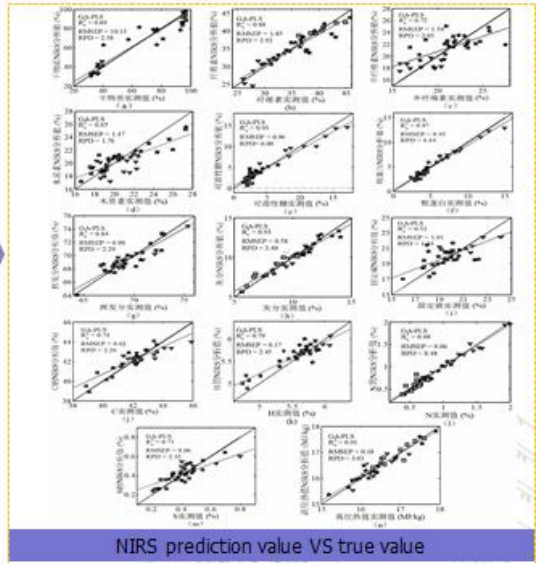


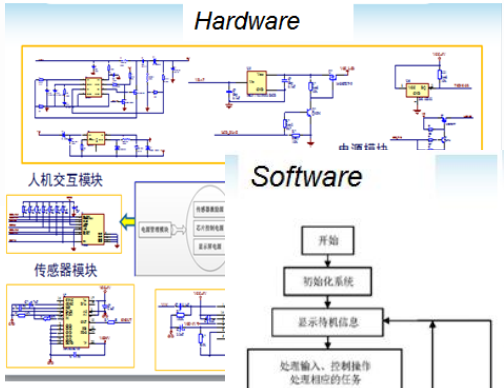
- *Weihua Xiao, Ximing Zhang, Xue Wang, Wenjuan Niu, Lujia Han*.* ***Bioresources****, 2015;*
- *Weihua Xiao, Wenjuan Niu, Fei Yi, Xian Liu, Lujia Han*.* ***Energy & Fuels****, 2013;*
- *Weihua Xiao, Lujia Han*, Yanyan Zhao.* ***Industrial Crops and Products****, 2011.*

NIR/IR/NIRM Detection and Assessment









- Junjie Xue, Zengling Yang*, Lujia Han. ***Applied Energy***, 2015;
- Xunpeng Jiang, Zengling Yang, Lujia Han*. ***Analytical and Bioanalytical Chemistry***, 2014;
- Chengxu Lü, Longjian Chen, Zengling Yang, Xian Liu, Lujia Han*. ***Applied Spectroscopy***, 2013;
- Xingfan Zhou, Zengling Yang, Guangqun Huang, Lujia Han*. ***Journal of Near Infrared Spectroscopy***, 2012.

International Collaboration Project

中國農業大學 China Agricultural University

※**H2020:** ***Sustainable techno-economic solutions for the agricultural value chain, AgroCycle (WASTE-2015-two-stage, 690142)***

AGROCYCLE for a circular economy

※**European Commission 7th Framework Project:** ***Quality and Safety of Feeds and Food for Europe, QSAFFE*** **(FP7-KBBE-2010-4, 265702)**

QSAFFE

SEVENTH FRAMEWORK PROGRAMME

Queen's University Belfast

QSAFFE - Quality and Safety of Feeds and Food for Europe

International Collaboration Project

中國農業大學 China Agricultural University

※Unilever R&D in Colwoth UK

Measurement and modelling study for transdermal delivery(2005-)

※ Walloon Agricultural Research Centre (Belgium)

International S & T Cooperation Program

—***Optical and Spectroscopy Methods for Detecting and Quantifying the Different Animal Protein Materials in Feeding stuffs*** **(2010DFA34540)**

—***Detection of Contaminants and Additives in Animal Feed Using Multi-information Fusion and Multi-detection NIRM plus Imaging techniques*** **(2015DFG32170)**

International Collaboration Project

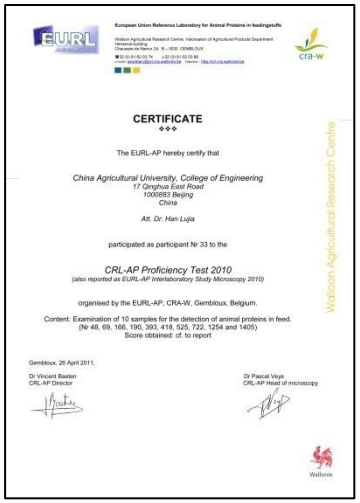
※**International Proficiency Test- Microscopy Method for MBM Detection**

EURL-AP/CRA-W (2009-2015)

IAG/RIKILT-Institute of Food Safety Wageningen UR (2011-2015)

※ **International Proficiency Test- NIRM Method for MBM Detection**

EURL-FA/Institute for Reference Materials and Measurements (IRMM), Joint Research Centre(JRC) (2009)


CERTIFICATE

The EURL-AP hereby certify that

China Agricultural University, College of Engineering
17 Qinghua East Road
100083 Beijing
China

Att. Dr. Han Lujia

participated as participant Nr 33 to the

CRL-AP Proficiency Test 2010
(also reported as EURL-AP Interlaboratory Study Microscopy 2010)

organised by the EURL-AP, CRA-W, Gembloux, Belgium.

Content: Examination of 10 samples for the detection of animal proteins in feed.
(Nr 48, 69, 166, 190, 393, 419, 525, 722, 1254 and 1405)
Score obtained: cf. to report

Gembloux, 26 April 2011.

Dr Vincent Baeten
CRL-AP Director

Dr Pascal Veys
CRL-AP Head of microscopy

CERTIFICATE

The EURL-AP hereby certify that

China Agricultural University, College of Engineering
17 Qinghua East Road
100083 Beijing
China

Att. Dr. Han Lujia

participated as participant Nr 32 to the

EURL-AP Proficiency Test 2011
(also reported as EURL-AP Proficiency Test Microscopy 2011)

organised by the EURL-AP, CRA-W, Gembloux, Belgium.

Content: Examination of 7 samples for the detection of animal proteins in feed.
(Nr 88, 245, 302, 388, 391, 436 and 607)
Score obtained: cf. to report

Gembloux, 22 May 2012.

Dr Vincent Baeten
EURL-AP Director

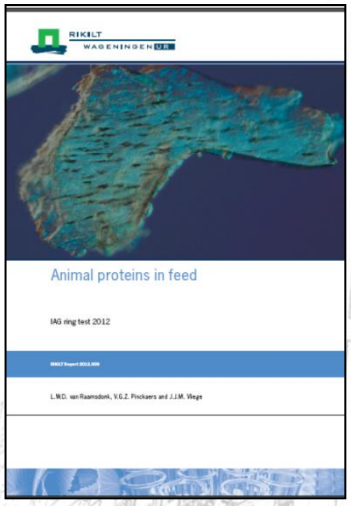
Dr Pascal Veys
EURL-AP Head of microscopy

RIKILT WAGENINGEN UR

To whom it concerns

Dear colleague, Dear IAG member,

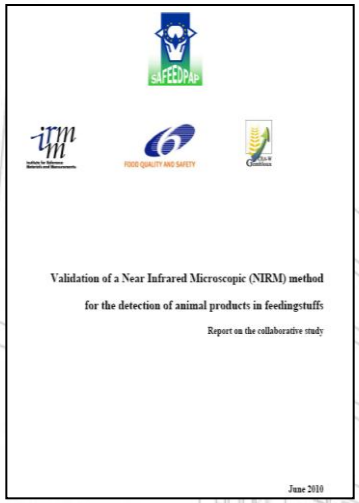
Dr. L. van Raamsdonk


RIKILT WAGENINGEN UR

Animal proteins in feed

IAG ring test 2012

L.W.D. van Raamsdonk, V.G.Z. Pinckaers and J.J.M. Vinge


SAFEEDPAP

Validation of a Near Infrared Microscopic (NIRM) method for the detection of animal products in feedingstuffs

Report on the collaborative study

June 2010

3. Cooperation Opportunities

- Government scholarship students
- Campus study tours
- Hosting workshops
- Hosting training courses
- Personnel exchanges
- ……

COE Academic Program

中国农业大学工学院
College of Engineering, CAU

Post-Doctoral Program

- Agricultural Engineering
- Mechanical Engineering

Ph. D. and MSc. Degree Program

- Agricultural Engineering
- Agricultural Mechanization Engineering
- Agricultural Biological System Engineering
- Processing and Storage of Agricultural Products
- Vehicle Engineering
- Mechatronic Engineering
- Mechanical Manufacture and Automation
- Mechanical Design and Theory

Master of Engineering Program

- Agricultural Engineering
- Mechanical Engineering
- Vehicle Engineering
- Project Management Engineering
- Industrial Design Engineering

Master of Agriculture Program

- Agricultural Mechanization

BSc. Program

- Agricultural Engineering
- Agricultural Mechanization and Automation
- Vehicle Engineering
- Mechatronic Engineering
- Machine Manufacturing & Automation
- Industrial Design

Welcome the ANTAM Delegation
CAU in Brief

中国农业大学工学院

工学院
COLLEGE OF ENGINEERING

中国农业大学工学院
COLLEGE OF ENGINEERING,CAU
Introduction of UIUC - CAU "3+2" Program

Biomass Resources and Utilization Labo

David Bramfield

ZHAO Sisi
JIA Baibei
Austin Taylor

中國農業大學
China Agricultural University

Thank you very much for your attention!