区块链技术在猪肉生产中的应用

The application of blockchain technology in pork production

吴强 Wu, Qiang

wuqiang@sanlogic.com

浙江清华长三角研究院

Yangtze Delta Region Institute of Tsinghua

University, Zhejiang

2021年10月28日

Contents 目录

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

Contents 目录

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

猪肉食品溯源涉及养殖、屠宰、加工、储运、销售等环节，并对其中生产、人员、财产、物流等关键环节信息进行组织、协调与管理，以期实现肉类食品质量安全追溯。

Pork traceability involves breeding, slaughter, processing, storage and transportation, sales and other links, and the organization, coordination and management of key information such as production, personnel, property, and logistics in each link, in order to achieve the traceability of meat food quality and safety.

肉类食品的溯源和其供应链管理是同一事物在不同视角下的产物。

The traceability of pork and its supply chain management are the product of the same thing from different perspectives.

供应链上的参与者可以大体分为生产者和消费者。

Participants in the supply chain can be roughly divided into producers and consumers.

➤ 从生产者的生产、管理视角来看，其行为是供应链管理；

From the perspective of the producer's production and management, its behavior is supply chain management;

➤ 从消费者购买、消费的视角看，与供应链的互动就是溯源。

From the perspective of consumer purchase and consumption, the interaction with the supply chain is traceability.

猪肉食品安全追溯Pork safety traceability

猪肉食品溯源管理应以整个社会为基础，用一种多角色、大规模、实时的社会化协同的方式，基于网络来创造新的价值。

Pork traceability management should be based on the entire society, using a multi-role, large-scale, real-time social collaboration method, and creating new value based on the network.

协同效应的价值体现：

The value of synergy:

➤ 信息的分享从串联走向并联；

 The sharing of information changes from series to parallel;

➤ 从一个相对封闭的供应链体系走向一个开放的体系；

From a relatively closed supply chain system to an open system;

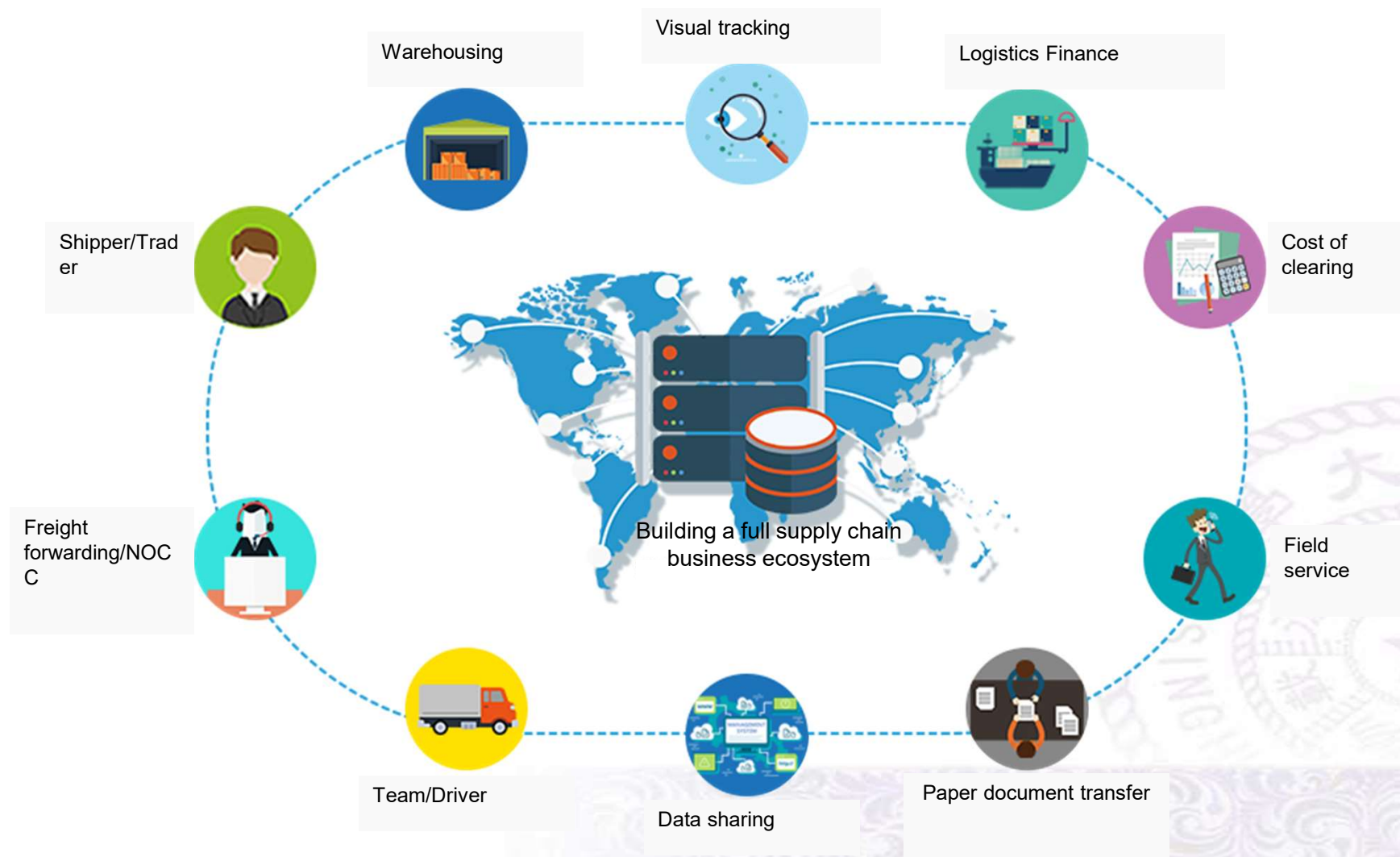➤ 互联网、云计算、大数据、人工智能、区块链等技术的发展，使传统产业逐步地转化、 改造升级成智能生态,

采用全新的方式运营一个社会化网络，打破传统规模不经济的僵局。

The development of technologies such as the Internet, cloud computing, big data, artificial intelligence, and blockchain has enabled traditional industries to gradually transform, transform and upgrade into an intelligent ecosystem, and use a brand-new way to operate a social network, breaking the deadlock of traditional diseconomies of scale.

猪肉食品安全追溯Pork safety traceability

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

Warehousing

Visual tracking

Logistics Finance

Shipper/Trader

Cost of clearing

Freight forwarding/NOCC

Building a full supply chain business ecosystem

Field service

Team/Driver

Data sharing

Paper document transfer

猪肉食品安全追溯Pork safety traceability

猪肉食品的冷链流通
The cold chain circulation of pork::

全渠道供应链管理
Omnichannel Supply Chain Management

产地厂家
Origin/manufacturer

冷冻
Freezing
-18℃

冷藏
Refrigeration
0-8℃

Temperature
温控
15℃

Cold chain
冷链车送货
logistics vehicle

一级经销商
Primary dealer

Cold storage, temperature preservation
冷库储存，温控保鲜

Cold chain
冷链车送货
logistics vehicle

二级经销商
Secondary dealer

Cold storage, temperature preservation
冷库储存，温控保鲜

Cold chain
冷链车送货
logistics vehicle

零售商
Retailer

消费者
Consumer

Scan code
扫码

Traceability
溯源

The whole process of credible information, traceability

全流程信息可信、可追溯

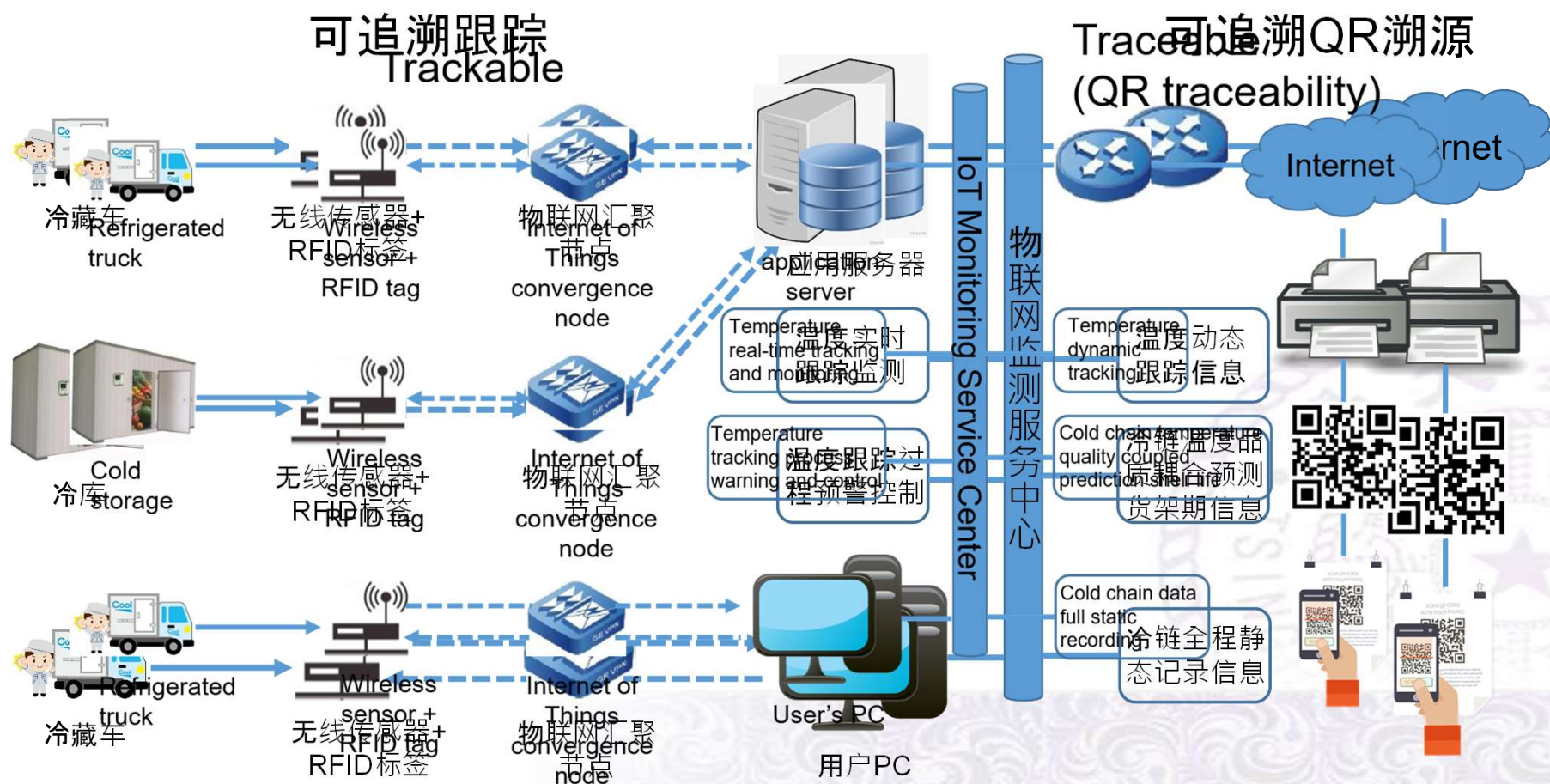# 猪肉食品冷链物流品质感知可追溯模型Pork cold chain logistics quality perception and traceability model
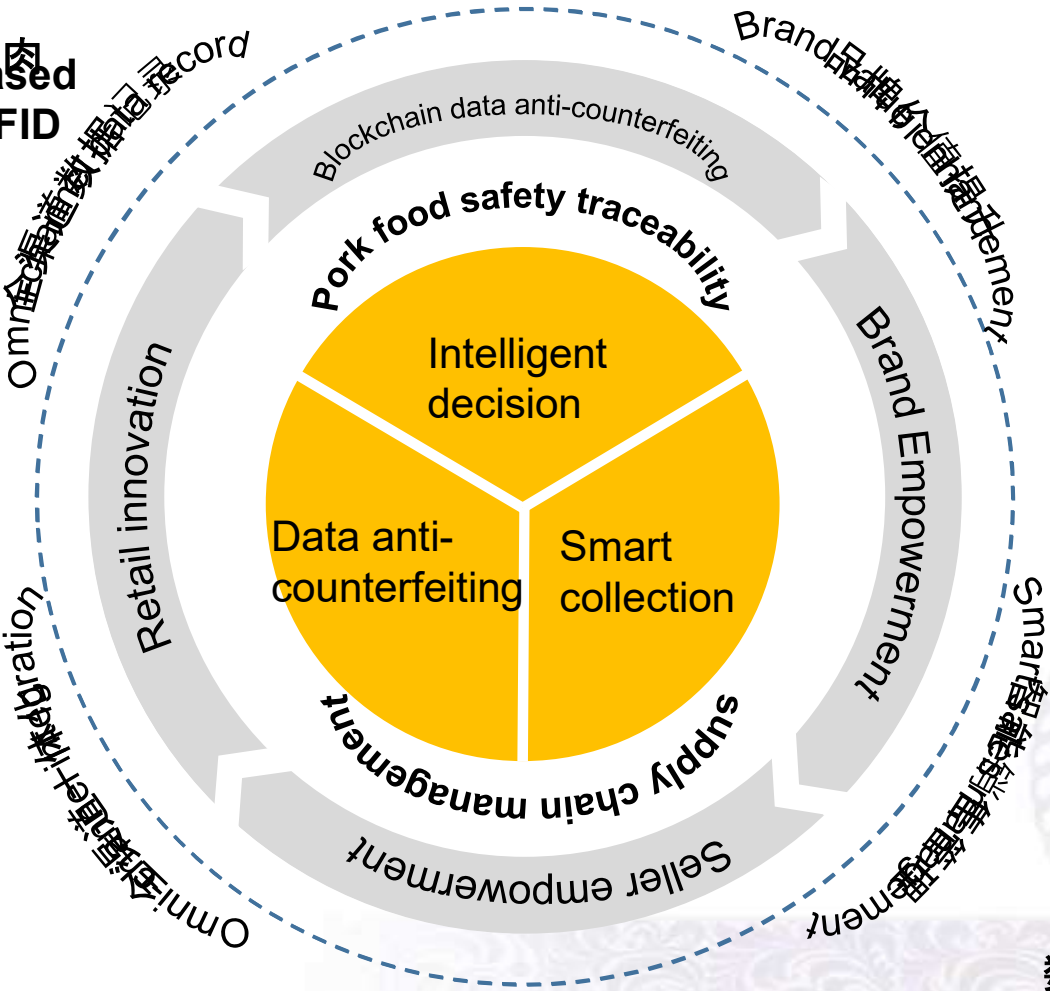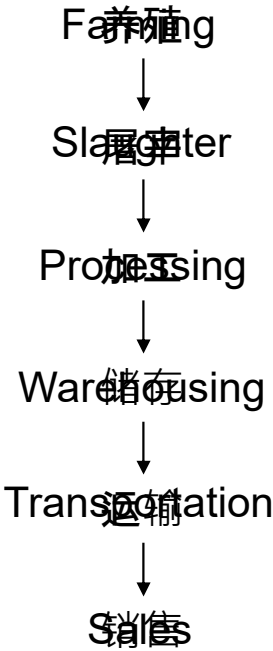
猪肉食品安全追溯Pork safety traceability

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

Pork cold chain traceability system based on blockchain and RFID

基于区块链与RFID的猪肉冷链追溯系统

Farming 养殖
↓
Slaughter 屠宰
↓
Processing 加工
↓
Warehousing 储存
↓
Transportation 运输
↓
Sales 销售

Pork food safety traceability

Intelligent decision

Data anti-counterfeiting

Smart collection

Blockchain data anti-counterfeiting

Brand value management 品牌价值管理

Brand Empowerment

Smart warehouse management 智能仓储管理

Seller empowerment

Supply chain management

Retail innovation

Omni-channel data record 全渠道数据记录

Omni-channel intelligent integration 全渠道智能整合

Supply Chain Collaborative Management
供应链协同管理

Blockchain technology ensures the safety and reliability of traceability information
区块链技术保证溯源信息安全可靠

RFID

RFID tracking
Automatic data upload, intelligent logistics management
RFID盘点
数据自动上传，智能物流管理

Contents 目录

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

区块链与猪肉食品溯源Blockchain and pork safety traceability

区块链是什么？ What is blockchain?

Distributed Ledger and Database
分布式存储

Consensus mechanism
共识机制

Smart contract
智能合约

Peer-to-peer transmission: P2P网络
点对点传输：P2P网络

Encryption Algorithm
加密算法

DAPP
DAPP

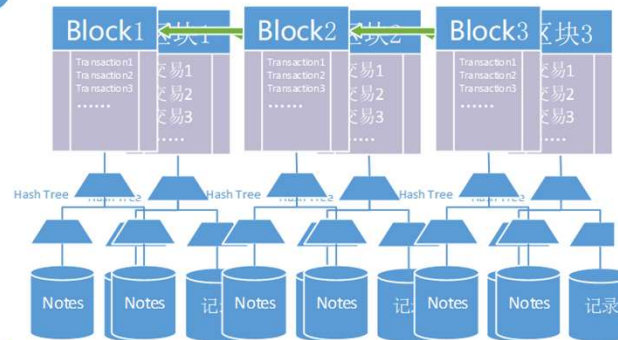# 区块链与猪肉食品溯源Blockchain and pork safety traceability

区块链技术具有去中心化、不可篡改、开放透明等特征，采用区块链技术可以有效解决传统的溯源平台信息不透明、数据容易篡改、安全性差、相对封闭等弊端和弱点。极大的提高了食品溯源系统的数据可信性。

Blockchain technology has the characteristics of decentralization, non-tampering, openness and transparency. The use of blockchain technology can effectively solve the shortcomings and weaknesses of traditional traceability platforms such as opaque information, easy data tampering, poor security, and relative closure. Greatly improve the data credibility of the food traceability system.
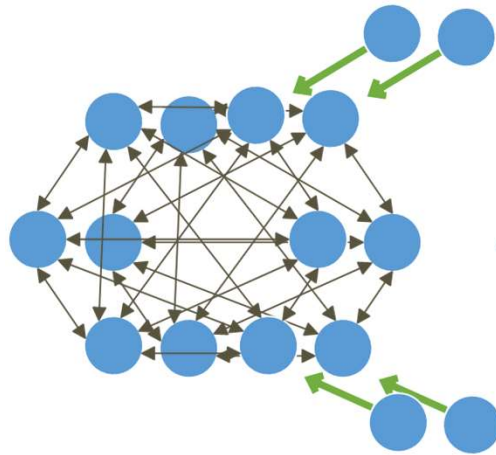
Dynamic networking 动态组网

- *Peer To Peer*
  Peer To Peer模式
- *Dynamic join and exit*
  动态加入/退出

Blockchain structure 区块链结构

- *Transparent and Traceable*
  透明、可溯源
- *Reliable data*
  不可篡改

Consensus 共识机制

- *Consistent*
  保持一致
- *Resist malicious attacks*
  抵抗恶意攻击

区块链与猪肉食品溯源Blockchain and pork safety traceability

　　采用区块链技术，实现肉类食品的源头信息、屠宰加工信息、物流仓储信息、交易信息等数据的永久性记录；结合智能合约，实现各环节信息自动写入，方便维护者科学操作。

　　Blockchain technology is used to realize the permanent record of the source information of meat food, slaughter and processing information, logistics and storage information, transaction information and other data; combined with smart contracts, the automatic writing of information in each link is realized, which is convenient for maintainers to operate scientifically.

Farming　Processing　Warehouse　Logistics　Retailer　Consumer　Display

Consumers scan the QR code to see the traceability information including the origin, production processes, use of fertilizers, harvesting dates, etc.

Core node group

Multi-center Institutions
Reliable Credibility
Comprehensive Information Record
Tow-way tracing
Real Data
Comprehensive Business Capabilities
Efficient Operation

全程信息显示

Consumers only read data. The central authority node completes the consensus process and records data.

Contents 目录

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

猪肉食品安全冷链追溯系统整体解决方案
The overall solution of pork food safety cold chain traceability system

Smart brain

Cold data network layout based on big data
大数据冷链网络布局

Cold chain industry analysis
冷链行业分析

Blockchain anti-counterfeiting traceability
区块链防伪溯源

Blockchain 区块链 + Big data analysis 大数据分析

Dispatch center

Full Link Smart Scheduling (Warehouse Matching Linkage)
全链路智慧排产（仓法配联动）

Automatically collect cold chain data
冷链数据自动采集

Cold chain storage 冷链仓储
Intelligent storage + intelligent picking 智能存储+智能拣选

Cold chain transport 冷链运输
Intelligent scheduling 智能调度

Distribution 配送分发
Intelligent sorting 智能分拣

Artificial intelligence (AI) 人工智能（AI）

Automation tool

Input 入库 | Storage 存储 | Pick 拣选 | Package 包装 | Output 出库 | Scheduling 调度 | 摆渡 | Transfer station 转站 | Sort 分拣 | Retail 零售

Automatic acceptance 自动验收 | Automatic inbound & outbound 自动存取 | Automatic picking 自动拣货 | Automatic package 自动包装 | Split flow 分合流 | | | | Automatic sorting 自动分拣 | Self-service cash register 自助收银

Palletizing robot 码垛机器人 | AGV handling 搬运 | Picking robot 拣货机器人 | Review packaging 复核包装 | AGV handling 搬运 | | Intelligent refrigerated truck 智能冷藏车 | | Sorting robot 分拣机器人 | Unmanned cashier 无人收银台

RFID technology enables each product to have a unique machine-recognizable tag that enables automatic data entry, more complete data and more efficient operations.
RFID技术使每个商品都拥有了唯一的机器可识别标签，数据自动录入，采集信息更加完备，运营效率更加高效。
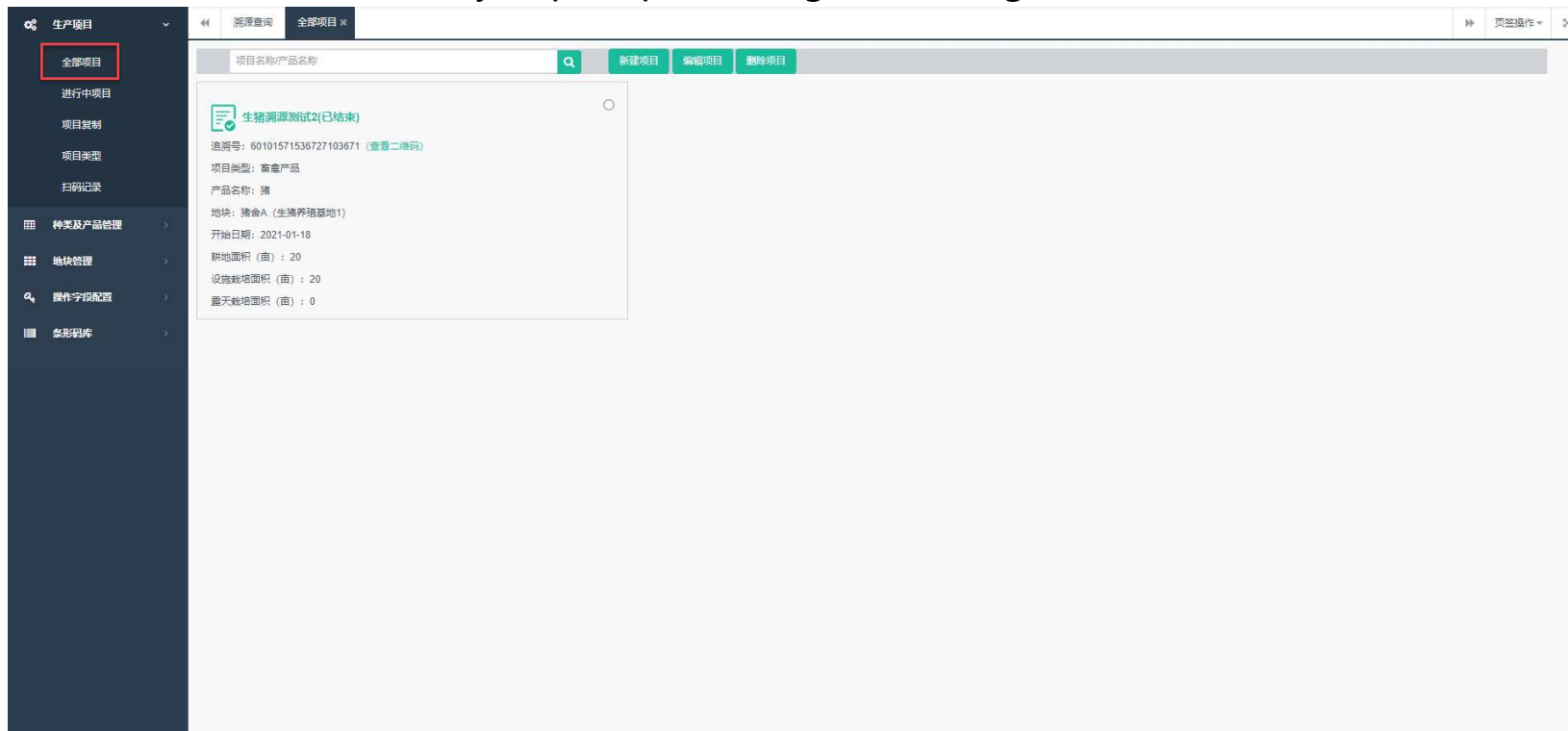
RFID RFID + Robot 机器人 + IoT IoT感知 Perception

高可信猪肉加工链溯源信息管理系统
Highly credible pork processing chain traceability information management system

高可信猪肉加工链溯源信息管理系统将猪肉加工销售企业、加工项目集中管理，生猪养殖及生鲜猪肉流通过程中，猪肉溯源信息会与与相应企业用户绑定在一起，便于问题追责，提高了造假成本，一定程度上保障了猪肉加工安全。

The high-credibility pork processing chain traceability information management system centrally manages pork processing and sales companies and processing projects. In the process of pig breeding and fresh pork circulation, pork traceability information will be tied to the corresponding enterprise users to facilitate accountability. The cost of fraud has been increased, and the safety of pork processing has been guaranteed to a certain extent.

高可信猪肉加工链溯源信息管理系统
Highly credible pork processing chain traceability information management system

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

用户将自己经营的猪肉产品（以生产项目的形式）信息录入到系统中，在此基础上，再将猪肉加工过程中的各阶段的管理操作过程记录到系统中，使得猪肉溯源信息与相应企业用户绑定在一起。

The user enters the information of his own pork products (in the form of production projects) into the system, and on this basis, records the management and operation process of each stage in the pork processing process into the system, so that the pork traceability information is consistent with the corresponding enterprise Users are tied together.

高可信猪肉加工链溯源信息管理系统
Highly credible pork processing chain traceability information management system

使用微信扫一扫功能，扫描溯源二维码，即可查看二维码对应批次的猪肉溯源信息。

Use the WeChat scan function to scan the traceability QR code to view the traceability information of the batch of pork corresponding to the QR code.

高可信猪肉加工链溯源信息管理系统
Highly credible pork processing chain traceability information management system

消费者可以通过关注微信公众号，打开"扫一扫"功能，扫描二维码查询猪肉产品溯源信息。

Consumers can follow the WeChat official account, turn on the "Scan" function, and scan the QR code to inquire about the traceability information of pork products.

❶ 溯源码加密实现有效防伪Traceable source code encryption to achieve effective anti-counterfeiting

猪肉溯源系统能够为同一生产流程的猪肉生成对应唯一的一个二维码，使用加密编码，包含独立的防伪溯源信息，实现有效防伪。

The pork traceability system can generate a unique two-dimensional code corresponding to the pork of the same production process, using encrypted coding, including independent anti-counterfeiting traceability information, to achieve effective anti-counterfeiting.

❷ 扫码统计监控市场动态Scan code statistics to monitor market trends

跟踪统计猪肉扫码数量、地域分布，实时监控猪肉市场动态，防窜货，帮助生产者调整生产方向和销售策略。

Tracking and counting the number of pork scan codes and geographical distribution, real-time monitoring of pork market dynamics, preventing cross-country, and helping producers adjust production directions and sales strategies.

❸ 自定义档案个性展示Custom file personality display

可根据不同需求，自定义添加生猪养殖档案，个性化编辑生猪养殖监管过程。

According to different needs, the pig breeding file can be customized to add, and the pig breeding supervision process can be edited in a personalized manner.

浙江清华长三角研究院
YANGTZE DELTA REGION INSTITUTE OF TSINGHUA UNIVERSITY, ZHEJIANG

THANK YOU

http://www.tsinghua-zj.edu.cn/