FEED TECHNO VISION 2024

Selko®

The Power of AI in Aqua Feed Milling & Feed Monitoring

Dejan D. Miladinovic, PhD
NORWEGIAN UNIVERSITY OF LIVE SCIENCES

NMBU

trouw nutrition
a Nutreco company

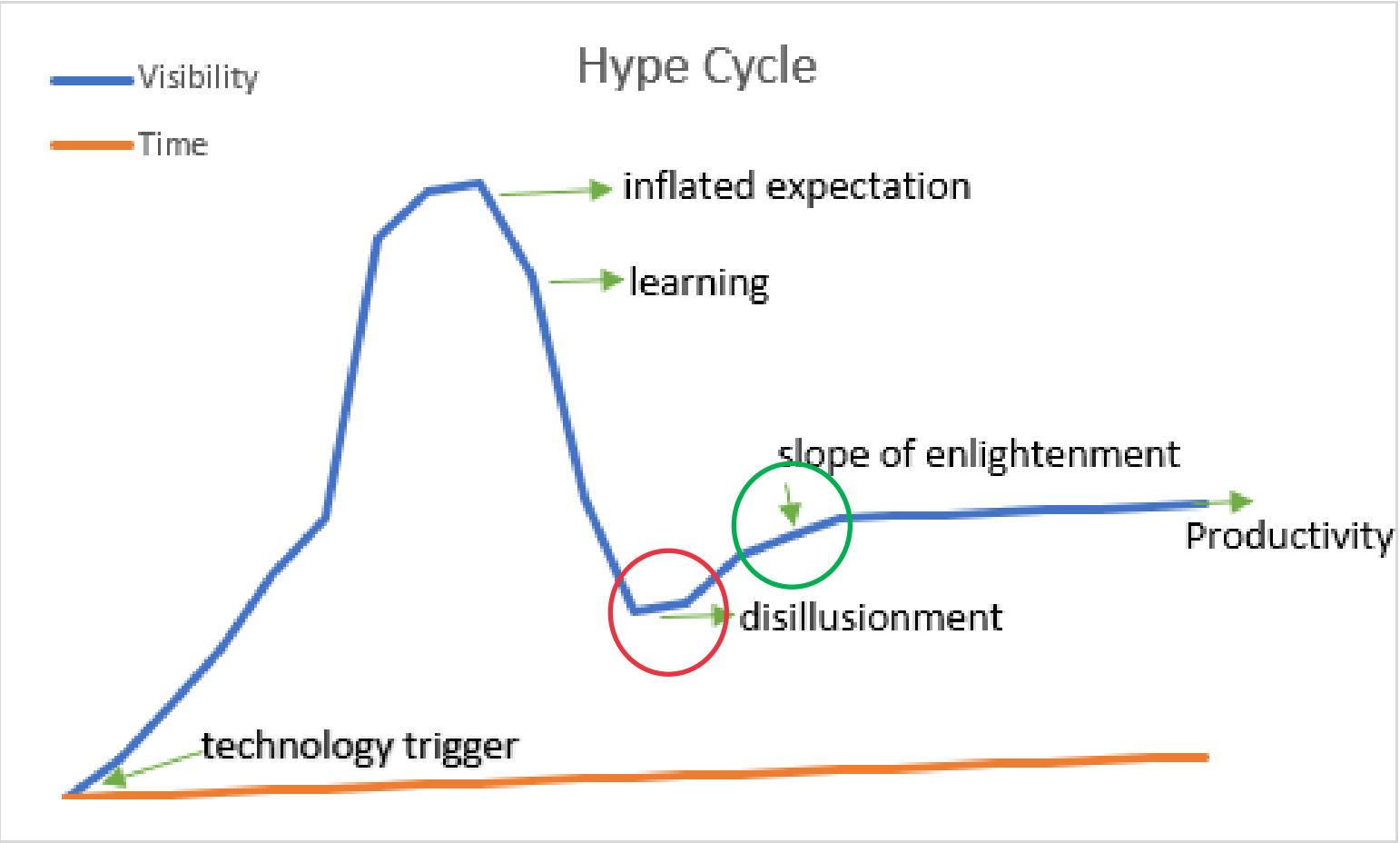
AI is Applied in Many Different Businesses

- Used in aquaculture for monitoring fish behaviour (O Donncha et al., 2021);
- AI-powered technology helps farmers to check the health of the soil and needed water (Ghorbani *et al.* 2019; Gautam *et al.*, 2023)
- AI protects the agricultural business from cyberattacks (Bui *et al.*, 2024)
- Next-generation farms are full of various sensors that monitor feeding, animal behaviour, air temperature and moisture at the farm (Bao and Xie 2022);

Example: Scare-crows equipped with ultrasonic emitters to repel pests

Why do we Need AI in Feed Production and Why Now?

- To extract useful patterns of feed manufacturing from data
- Data, hardware and monitoring tools exist



The Power of AI : Using Hidden Data to Increase Feed Mill Margines

- Predictive analytics:
  - Data correlating feed processing and formulation on feed consumption, animal behavior and animal health
  - Prediction of optimized raw materials for:
    - targeted formulation,
    - feed processing,
    - animal growth stages and
    - production goals.

- Robotic automation during feed manufacturing and raw material ordering,

- Traceability of the feed raw materials, feed processing and finished feed in farms.

Examples

Example: Predictive Analytics for Optimal Shrimp Feed Production

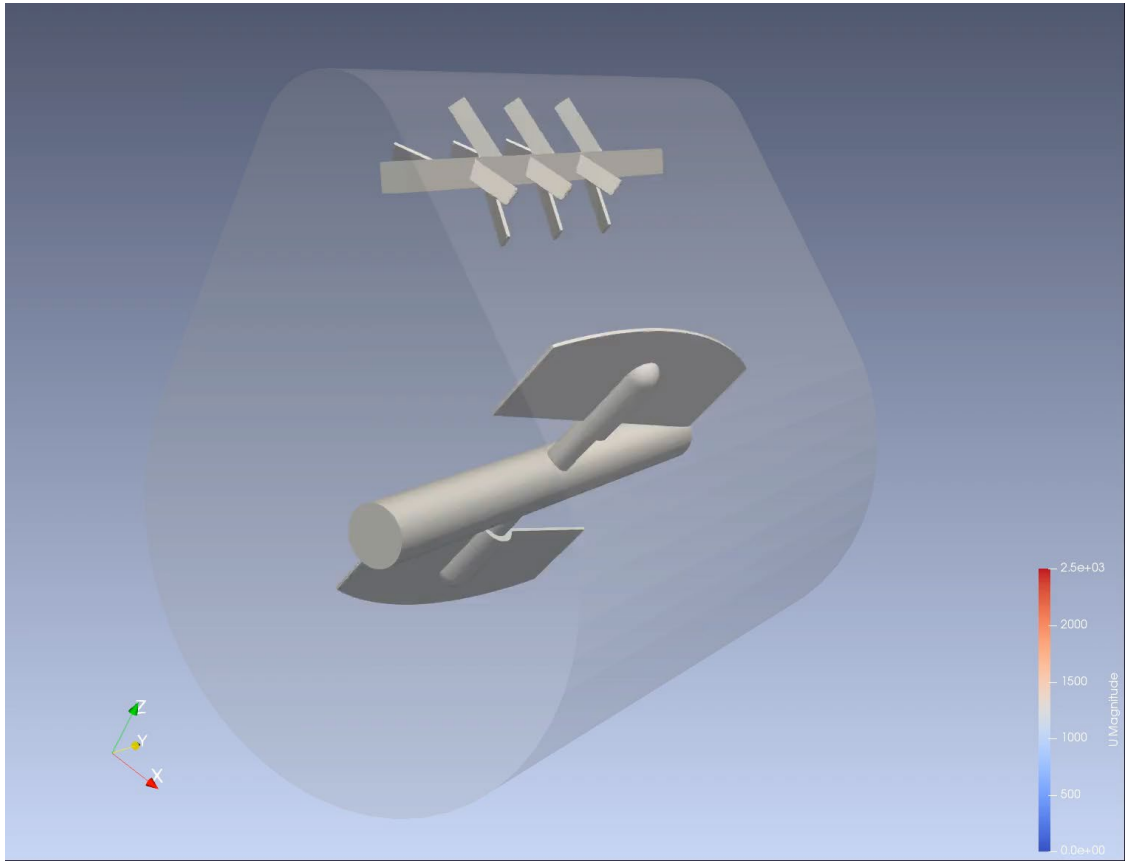
- Predictive analytics:
  - Historical and real-time data used for:
    - forecasting future production outcomes,
    - trends in the feed mill and at the farm,
    - following behavior at the shrimp farm regarding certain novel feed ingredient in the shrimp feed pellets;

- AI models to analyze:
  - Ingredient prices,
  - Shrimp growth rates,
  - Market demand to optimize feed formulation,
  - Production scheduling, and inventory management.

Source: fish-feed-extruder.com

Another example: Novel mixing technology

IsDeCa® mixing technology



FEED TECHNO VISION 2024

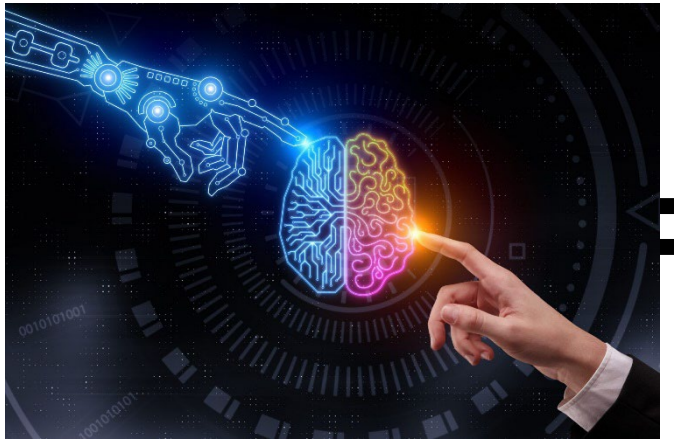
The Power of IA in Aquafeed Milling & Feed Monitoring

- Predict the future best you can;
- Robotic automation;
- Optimized traceability of the raw materials;
- Optimized feed processing and delivery of finished feed to the farms.

Optimized Formulation With Help of AI

- Large datasets of ingredient characteristics, nutritional requirements, and aquatic animal performance;
- Ingredient availability, cost, and nutritional value;
- Generating feed formulas that maximize growth and feed conversion with minimal production costs;
- Improving margins for feed mills.

+

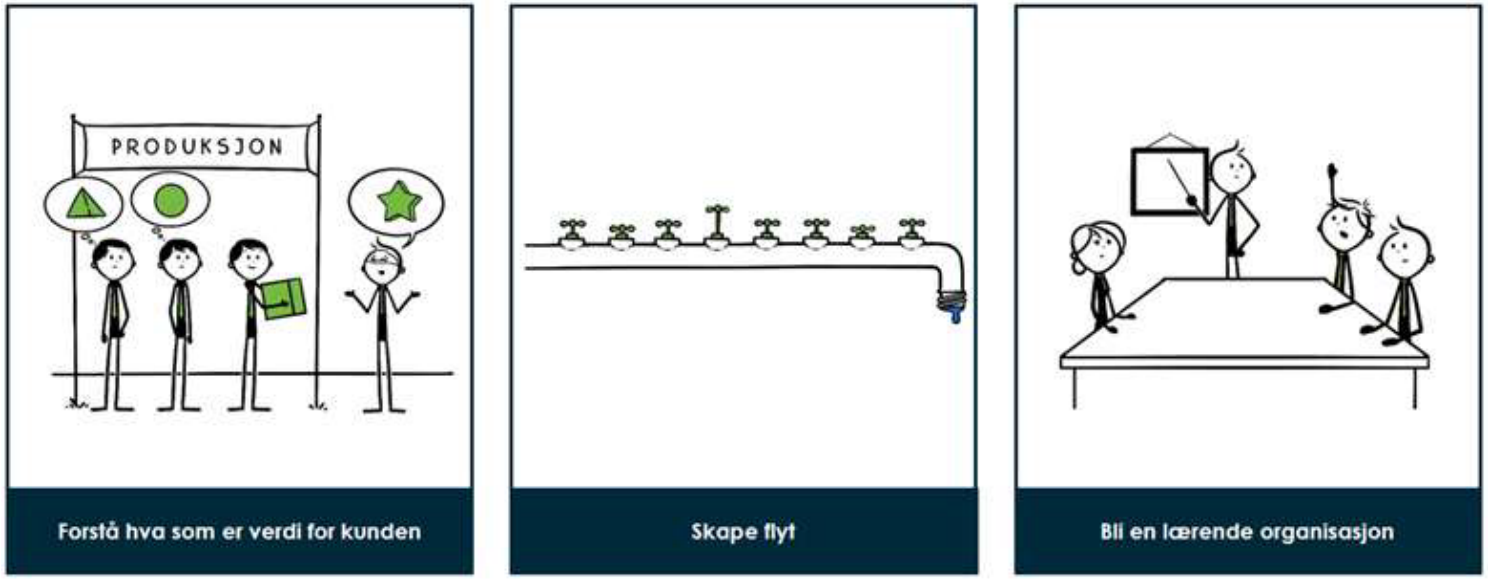


=

FEED TECHNO VISION 2024

AI can Understand Complex Supply Chain, LEAN and Price Strategies In a Millisecond

- Optimization - Ingredient sourcing;
- Optimization - Transportation logistics;
- Identifying bottlenecks within the supply chain;
- Pricing strategies by analyzing market data, consumer trends, and competitor behavior.



The power of AI in Feed Milling R&D

- Advancements in feed formulation (novel ingredients, precision nutrition, and computational modelling for optimizing feed composition);
- Sustainable Feed Production (waste reduction and minimized environmental impact);
- Feed Safety and Quality Assurance (sourcing, manufacturing processes, monitoring for contaminants and toxins);
- Regulatory Compliance (labeling requirements, safety standards, and international trade regulations);

Utilizing Hidden Data

1. Extracting large-data insights,

2. Optimizing processes of the feed production and supply chain management,

3. Connecting the analytics of AI may bring opportunities for:
   - efficiency gains,
   - cost savings, and
   - profitability in the highly competitive aqua feed milling industry.

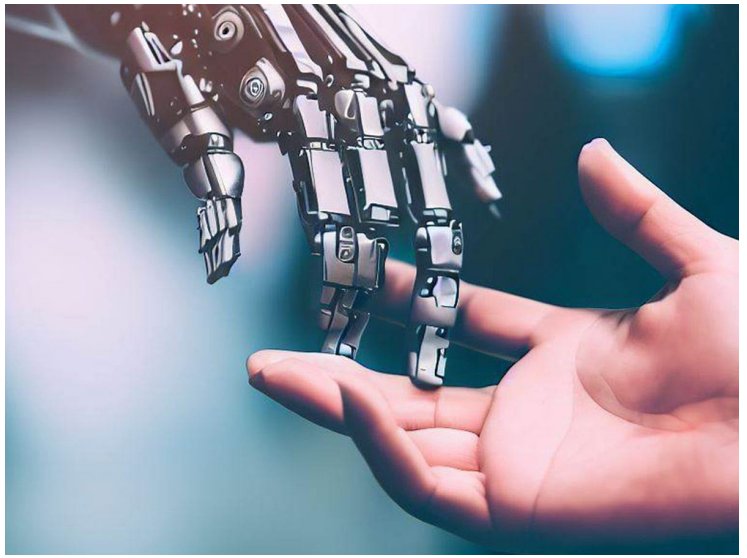
Future Trends in Feed Technology by AI utilization

- Use of biotechnology, nanotechnology, and alternative protein sources;
- Collaboration and knowledge sharing to advance feed technology and address common challenges;
- Open innovation within personalized animal nutrition.

Pros & Cons of Implementing the AI in Aquatic Feed Manufacturing

Pros	Cons
1. Customized formulations	1. Significant investment in equipment, software, and training
2. Maximizing nutritional value and minimizing waste	2. Accessing and maintaining datasets can be challenging
3. Reduced costs with best possible outputs	3. Small operations may have limited data infrastructure
4. Increased efficiency during manufacturing and delivery	4. Risk of Error (nutritional imbalances, change of prod. parameters)
5. Sustainable feed manufacturing	5. Ethical concerns (data privacy)

Careful consideration of potential benefits and challenges is essential for successful implementation



Key Aspects & Conclusion

- Optimization of Ingredient Formulation
- Process Automation and Control
- Quality Assurance and Traceability

By focusing on these aspects, AI can revolutionize aqua feed milling, leading to higher-quality feeds, increased efficiency, and improved sustainability in aquaculture operations!

FEED TECHNO VISION 2024

Selko®

Thank you!

dmilad@nmbu.no

trouw nutrition
a Nutreco company