Animal Health & Nutrition
An alliance for growth

Helle Warrer Poulsen, Vice President Animal Health & Nutrition, Novozymes
Mark Stock, President, Animal Nutrition & Health, DSM Nutritional Products
Signe Munk, Vice President R&D, Novozymes
Forward-Looking Statements

This presentation and its related comments contain forward-looking statements, including statements about future events, future financial performance, plans, strategies and expectations. Forward-looking statements are associated with words such as, but not limited to, "believe," "anticipate," "expect," "estimate," "intend," "plan," "project," "could," "may," "might" and other words of similar meaning.

Forward-looking statements are by their very nature associated with risks and uncertainties that may cause actual results to differ materially from expectations, both positively and negatively. The risks and uncertainties may, among other things, include unexpected developments in i) the ability to develop and market new products; ii) the demand for Novozymes' products, market-driven price decreases, industry consolidation, and launches of competing products or disruptive technologies in Novozymes' core areas; iii) the ability to protect and enforce the company's intellectual property rights; iv) significant litigation or breaches of contract; v) the materialization of the company's growth platforms, notably the opportunity for marketing biomass conversion technologies or the development of microbial solutions for broad-acre crops; vi) the political conditions, such as acceptance of enzymes produced by genetically modified organisms; vii) the global economic and capital market conditions, including, but not limited to, currency exchange rates (USD/DKK and EUR/DKK in particular, but not exclusively), interest rates and inflation; viii) significant price decreases on input and materials that compete with Novozymes' biological solutions. The company undertakes no obligation to update any forward-looking statements as a result of future developments or new information.
Session outline

• Novozymes’ position and offering in Animal Health & Nutrition
• Views from DSM: solutions and value creation in animal farming
• R&D priorities
The world needs sustainable efficiency gains in animal production

1. World population expected to reach 9+ billion by 2050
2. Changing diets are expected to double the demand for protein over the next 40 years
3. Feed costs make up +50% of animal production costs
4. Arable land per capita expected to decrease by 35% from 2000 to 2050
5. Antibiotic resistance and regulation are driving the need for alternatives to antibiotics

Sustainable efficiency gains are essential. Biological solutions are part of the solution

The Animal farming value chain offers several opportunities for biological solutions

<table>
<thead>
<tr>
<th>Crop farming</th>
<th>Raw material processing</th>
<th>Trading &amp; logistics</th>
<th>Feed compound</th>
<th>Feed distribution &amp; sale</th>
<th>Animal farming</th>
<th>Animal processing</th>
<th>Retailing</th>
<th>Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed developers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract farms &amp; farm financing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local rearsers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop Input companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizers, Ag-chemicals, BioAg, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commodity processor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crushing and/or milling from raw material to e.g. oil and meal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and alcohol refiners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refiniment of oil or starch, feed by-products such as DDGS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed refiners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upgrader of by-product to higher-grade feed product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage &amp; transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commodity trading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed additive suppliers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enzymes, probiotics, organic acids, essential oils, vitamins, amino acids, minerals etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premixers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix feed additives into ready-to-use premixes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed compounders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larger compound feed producer, tendering premixers for input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local feed mill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compound feed producer w/o premixing unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home mixers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmers with own feed mixing equipment buy directly from premixer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed animals, change additive mixes according to age, weather conditions, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract animal farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processors &amp; packagers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global &amp; regional retailers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass consumers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National retailers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mom &amp; Pop shops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niche consumers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Influencers:
Co-operatives, nutritionists, veterinarians, software companies, regulators, food safety authorities, academia, key opinion leaders
Building a stronger offering within animal farming

“To help feed a growing world, we work with partners to develop and drive adoption of proven biological innovations that improve feed efficiency and animal health”

Partner model

- A shared vision
- Aligned strategic interests in the project and the product
- Willingness to invest
- Complementary capabilities

Novozymes
- Screening & *in vitro*
- Upscaling & production

Partner
- *In vivo & application*
- Sales & marketing

Business development

- Upgrading of co-and by-products to higher value products, enabling category shifts
- Leveraging existing market access, customer relationships and our strong technical capabilities within raw material processing from adjacent industries
- Enzymatic and microbial solutions for natural growth promotion
- Leveraging large collection of microbial diversity and strong technical capabilities in microbe ecology, analytics and production
The strategic alliance with DSM has been a success and is core to Novozymes

9% sales growth CAGR since 2001

#1 enzyme supplier to the animal feed industry

€ ~600 million market growing at >5%

~35% penetration rate of existing products

Estimated penetration rates in swine & poultry

Others, including DuPont, Ab Vista, BASF, Local Chinese etc.

Strategy elements:

Innovation and science leadership
Regionally customized solutions and services
Production quality and economics

Source: Frost and Sullivan 2014 Feed ingredient report
Serving a highly efficient protein value chain

Active Ingredients
- Commodity market products from food and fuels
- Active ingredient producers: Vitamins, Minerals, Enzymes, Carotenoids, Health products, Others

Forms & delivery systems
Full range feed producers (premix, specialties and compound feed)
- Premix & Macro blends producers
- Compound feed producers
- Farmers

Premix
Compound Feed
Farmer
Meat/dairy Processor

Macro Blends

Nutritional consultancy & services

Forms & delivery systems

Premix

Dairy processing
Meat slaughtering & processing

Home-mixing farmers
Vertically integrated producers

Nutritional consultancy & services

Full range feed producers (premix, specialties and compound feed)
- Premix & Macro blends producers
- Compound feed producers
- Farmers

Meat/dairy Processor

Dairy processing
Meat slaughtering & processing

Home-mixing farmers
Vertically integrated producers
Facts about our Alliance
Commitment to success and sharing tasks

No. 1 in bioinnovation
- More than 1,000 dedicated R&D employees around the world
- Large microorganism and enzyme collection
- Enzyme screening
- Protein engineering
- In vitro trials
- Toxicity testing
- Patent filing
- Formulation development
- Large-scale, global production
- Scientific publications

No. 1 in animal nutrition
- In vivo trials
- Stability testing (in feed chain)
- Registration dossiers
- Scientific publications
- University & contract research
- Scientific network
- In-feed analytics
- Market evaluation
- Business intelligence
- Distribution
- Marketing communication
- Global premix manufacture
- Global marketing, sales and distribution
- Laboratory service
Creating Value with our Customers

Key Enablers
- Global Products
- Local Solutions

DSM Nutritional Products Ltd.

DSM* Actives
Novozymes Enzymes

DSM* Forms
Novozymes Forms

Premix
Solutions
Access & Insights

* DSM Nutritional Products Ltd.
Our product range helps farmers meet increasing consumer demands for welfare Standards.

We are committed to helping poultry farmers reduce the environmental impact of their operations.

Our product range helps customers achieve optimal poultry health, addressing both consumer and producer needs.

Consumers in different countries have very specific ideas about the 'right' color of poultry skin and egg yolk. Our products can help customers meet these varied demands.

To produce evenly sized birds within a set timeframe, poultry producers require rapid and consistent growth. We can help our customers achieve optimal growth.

Reducing feed costs per bird is a priority for every producer. Our products can help customers increase the return on their valuable investment.

- **Hy-D®**
- **CRINA® Poultry Plus**
- **RONOZYME® NP**
- **RONOZYME® HiPhos**
- **RONOZYME® WX**
- **RONOZYME® ProAct**
- **OVN™**
- **RONOZYME® WX**
- **RONOZYME® ProAct**
- **RONOZYME® NP**
- **RONOZYME® HiPhos**
- **CRINA® Poultry Plus**
- **Hy-D®**
- **OVN™**
- **ROVIMIX®**
- **CYLACTIN®**
- **CAROPHYLL® Red**
- **CAROPHYLL® Yellow**
- **RONOZYME® NP**
- **RONOZYME® HiPhos**
- **RONOZYME® ProAct**
- **CRINA® Poultry Plus**
- **OVN™**
- **MaxiChick™**
- **ROVIMIX®**
- **CRINA® Poultry Plus**
- **RONOZYME® ProAct**
- **RONOZYME® WX**
- **RONOZYME® VP**
- **RONOZYME® NP**
- **RONOZYME® HiPhos**
- **RONOZYME®**
As consumers pay more attention to where and how their food is produced, welfare standards are becoming increasingly important.

In several countries swine producers are required to implement environmental controls at every stage of production to protect the air, soil and water.

Healthy swine reproduce more efficiently, show better feed efficiency and grow faster. They require less veterinary intervention and incur fewer treatment costs.

Our innovative products can help farmers increase the breeding life and reproductive performance of sows and gilts, resulting in a considerable financial benefit.

Achieving optimal growth rates while delivering the required carcass composition can mean the difference between profit and loss in swine production units.

Feed is the largest cost of pork production. Our products enable customers to increase feed efficiency and nutrient utilization, leaving them with more funds to invest in other areas.

---

Solutions to meet the needs of the SWINE industry

**Welfare**
- VevoVitall®
- MicroSource® S
- Hy-D®
- ROVIMIX®
- OVN™

**Environment**
- RONOZYME® HiPhos
- RONOZYME® WX
- RONOZYME® NP
- VevoVitall®
- MicroSource® S

**Health and survival**
- VevoVitall®
- CYLACTIN®
- CRINA® Swine
- ROVIMIX®
- OVN™

**Breeding performance**
- Hy-D®
- ROVIMIX®
- OVN™

**Optimal growth**
- VevoVitall®
- CYLACTIN®
- CRINA® Swine
- RONOZYME® HiPhos
- RONOZYME® WX
- RONOZYME® NP

**Feed cost savings**
- RONOZYME® HiPhos
- RONOZYME® WX
- RONOZYME® NP
- VevoVitall®
Solutions to meet the needs of the AQUACULTURE industry

**Welfare**

Our nutritional products help the aquaculture industry deliver high welfare standards by enhancing fish health. They boost survival rates and immunity while promoting environmentally friendly conditions.

- **RONOZYME® ProAct**
- **RONOZYME® WX**
- **ROVIMAX® NX**
- **ROVIMIX® STAY-C®35**
- **ROVIMIX® E50**
- **OVN™**

---

**Environment and sustainability**

Our innovative ingredients promote sustainable production by increasing the utilization of nutrients by fish and reducing the amount of waste excreted. This improves performance, and reduces the impact of fish farming on the environment.

- **RONOZYME® WX**
- **RONOZYME® P**
- **ROVIMAX® ProAct**
- **DHAgold™**

---

**Health and survival**

Nutrition management is an important tool in promoting aquaculture health, reducing the negative impact of disease and improving fish survival rates. Our nutritional products help our customers to nourish fish and enable them to thrive.

- **ROVIMIX® STAY-C®35**
- **ROVIMAX® NX**
- **ROVIMIX® E50**
- **Vevodar™**
- **ROVIMAX® Health Premix**
- **OVN™**

---

**Pigmentation**

Consumers increasingly select fish on the basis of optimal appearance – specifically color. Our products provide a consistent and reliable flesh pigmentation solution for the aquaculture industry.

- **CAROPHYLL® Pink**
- **ROVIMIX® β-Carotene**

---

**Optimal growth**

Nutrition management is an important tool for our customers in improving aquaculture performance. It can help reduce the impact of disease, improve the digestibility of nutrients, and achieve more profitable growth.

- **ROVIMAX® NX**
- **ROVIMIX® STAY-C®35**
- **RONOZYME® P**
- **RONOZYME® NP**

---

**Feed cost savings**

Due to both cost and sustainability, fish and other animal meals are progressively being replaced by plant meals. Our products help customers reduce feed costs by releasing key nutrients from plant meals, increasing digestibility and enhancing energy efficiency.

- **RONOZYME® P**
- **RONOZYME® NP**
- **RONOZYME® ProAct**
- **RONOZYME® WX**
Welfare standards are essential for modern dairy farms. They have a significant impact because healthy animals deliver improved performance.

Cattle farming has to operate with ever-increasing sensitivity to the needs of the environment. Our products provide practical solutions to the challenge of increasing production in a sustainable way.

Improving lifetime performance and longevity is the key to profitable dairy farming. ROVIMIX® vitamins and CRINA® essential oil components help cows achieve their potential by staying in the herd longer and producing more.

Farmers looking for higher-yielding cows with strong hooves can rely on our nutritional supplements to deliver animals that perform over a long and productive lifespan.

Udder infections cost the dairy industry a lot of money every year in terms of reduced milk yields, lower milk income, increased treatment costs and higher rates of early culling.

By increasing the effectiveness of the rumen more energy and protein is available to the animal. This means similar performing diets can be produced from lower price ingredients.

- **Welfare**
  - ROVIMIX® Biotin
  - ROVIMIX® β-Carotene
  - ROVIMIX® E50
  - CYLACTIN®
  - OVN™

- **Sustainability**
  - ROVIMIX® Biotin
  - ROVIMIX® β-Carotene
  - ROVIMIX® E50
  - CRINA® Ruminants

- **Lifetime performance and reproduction**
  - ROVIMIX® Biotin
  - ROVIMIX® β-Carotene
  - ROVIMIX® E50
  - CRINA® Ruminants
  - OVN™
  - DSM profit fertility calculator

- **Milk yield**
  - ROVIMIX® Biotin
  - CRINA® Ruminants
  - RONOZYME® RumiStar™
  - Bovigold® RumiStar™ (Tortuga Brazil Premix)

- **Udder health**
  - ROVIMIX® E50
  - ROVIMIX® β-Carotene

- **Feed cost savings**
  - CRINA® Ruminants
  - RONOZYME® RumiStar™
  - Fosbovi® RumiStar™ (Tortuga Brazil Premix)
Global Premix Network (44) to Deliver Local Solutions Across the Globe

North America (4)
- Cambridge, Ontario
- Jefferson, Georgia
- Ft. Worth, Texas
- Ames, Iowa

Latin America (12)
- Guadalajara, Mexico
- Guatemala City, Guatemala
- San Jose, Costa Rica
- Caracas, Venezuela
- Bogota, Columbia
- Quito, Ecuador
- Lima, Peru
- Puerto Mont, Chile
- Montevideo, Uruguay
- Buenos Aires, Argentina
- Sao Paulo, Brazil
- Pecem, Brazil

Europe (13)
- Belfast, Northern Ireland
- Heanor, UK
- Deinze (2), Belgium
- Madrid, Spain
- Milan & Fidenza, Italy
- Mszczonow, Poland
- Lysia, Greece
- Istanbul, Turkey
- Uihartyan, Hungary
- Chelyny, Russia
- Bucharest, Romania

Africa (2)
- Isando, S. Africa
- Lagos, Nigeria

China (5)
- Xinghou, China
- Shandong, China
- Hunan, China
- Jilin, China
- Sichuan, China

Asia Pacific (8)
- Bangkok, Thailand
- Ho Chi Min City, Vietnam
- Ambernotth, India
- Poseung, South Korea
- Shizuoka, Japan
- Wagga Wagga, Australia
- Calamba City, Philippines
- Indonesia (Project)

Premix Plant
Research centers
Tortuga Ruminant Premix Solutions

For Brazil
Building on a strong heritage, R&D focus has intensified over the last 2 years

1. Forceful pursuit of science leadership with DSM alliance across species, product classes and regions

2. Build broader science, supply and application knowledge within Animal Health & Nutrition – including and beyond nutritional enzymes

- First pelleting-stable phytase on the market
- First stable, pure feed protease establishing new feed enzyme segment
- Superior phytase with extra phosphorus effects
- Highly pelleting-stable NSP multicomponent product
- First feed enzyme approved for ruminants in the EU

Life stage solutions

Phytases
Proteases
Carbohydrases

20 years of know-how built up in feed enzymes

Adjacency: Enabling new feed ingredients

Explore innovative enzymatic solutions and processes for feed ingredient processing & upgrading

Adjacency: Animal health additives (e.g. probiotics)

Leverage large collection of microbial diversity and technical capabilities to move fast to market
R&D has a key role in the alliance to drive science & service position – from the lab over production to market

**Species**
- Today, focus on monogastric animals. Poultry makes up roughly 2/3 of industry, swine 1/3. Focus reflects this situation, but takes into account long-term opportunities within all species

**Local solutions & service**
- Alliance working on improving go-to-market service model and tools. Regional science manning up to support alliance, engage opinion leaders and customers

**Global products**
- **Phytases**: Most mature technology, but still innovation potential – Working on next-generation solutions to build differentiation
- **Proteases**: Early days. Lot of legroom to learn, adapt and for new solutions to enable penetration
- **Carbohydrases**: Big opportunities to deliver more energy to the animal and work on more crop types
- **New enzyme classes, blends and more crops in scope**

**New diversity**
- **Microbial screening** for feed-degrading organisms
- **Proteomics**: Which enzymes are induced in presence of relevant feed?
- **Bioinformatics** in silico screening
Conclusion

• Strong fundamental growth opportunities within Animal Health & Nutrition

• Novozymes works with partners to develop and drive adoption of proven biological innovations that increase feed efficiency and animal health

• Core of our strategy is feed enzymes with DSM Nutritional Products

• Novozymes and DSM Nutritional Products are committed to strengthen our Alliance for growth. We aim to do this by leveraging our innovation and science leadership, by regional solutions and services and by our production quality.