SWINE TECHNOLOGY

INNOVATIONS IN PORK PRODUCTION

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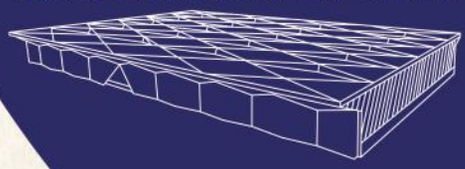

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SWINE TECHNOLOGY

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From the Editor's Desk

Welcome to the inaugural issue of Swine Technology magazine, a new feather in the cap of S R Publications.

When we imagined this magazine, we wanted a space that celebrates curiosity, clarity, and craftsmanship – a place where smart ideas meet accessible storytelling. Each page in this first issue reflects that vision: thoughtful articles, latest information about the industry, practical how-tos, profiles of people doing meaningful work, and a few conversations.

We're committed to quality journalism, fresh perspectives, and design that makes reading a pleasure. More than that, we want this magazine to be a conversation starter. Thank you for your continuous support and for joining us at the beginning.

In the first editorial, our message to the valuable pig farmers we want you to protect your animals and farm productivity. Please take proactive steps to manage heat stress. Pigs are highly sensitive to heat because they lack functional sweat glands and have relatively small lungs, making them unable to cool themselves effectively through sweating. Ensure constant access to clean, cool drinking water. Pigs may drink up to six times their normal amount during heat stress. Check that drinkers provide adequate flow rates. Shift feeding times to the cooler early-morning or late-evening hours. Consider increasing the nutrient and energy density of the diet to compensate for lower intake.

Another serious matter to be discussed is that African Swine Fever (ASF) has severely disrupted India's piggery sector, particularly in the Northeast, where pig farming is a vital cultural and economic pillar. Since its first detection in 2020, the disease has caused catastrophic livestock and financial losses across multiple states. Many farmers, especially smallholders and backyard rearers, have been forced to close their units or reduce holdings, leading to widespread job losses in a region where 45% of India's pig population is concentrated. Outbreaks lead to "distress sales" in which panicked farmers sell pigs at extremely low prices to minimise losses, further destabilising local market prices. Let's hope to correct all this in the near future.

With this, we once again Thank You and need all your usual cooperation to continue the publication year after year.

ARTICLE'S INDEX

श्री श्याम प्रोटीन पशु आहार

100% शुद्ध

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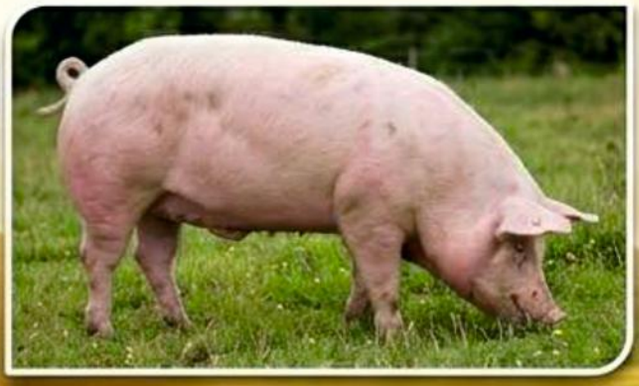

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करनाल, हरियाणा

FOR PREMIUM PIG NUTRITION - VISIT US OR CALL NOW

Uneven medium chain fatty acids and macro molecules – a European concept for piglet health

Christian Lückstädt and Prasad Kulkarni

Gastrointestinal diseases pose a serious threat to commercial swine production. In the past this hazard was controlled by the prophylactic use of antibiotics. However, animal production is viewed critically for its use of antibiotics, both from consumers and regulatory authorities, due to the risk of increased antimicrobial resistances. As a result, various feed additives have been studied as alternatives. Currently, there is growing interest in natural alternatives such as bioactive compounds, which are characterized by high food safety as well as consumer acceptance. Several independent publications revealed that various medium-chain fatty acids are known to be good antimicrobials as well as gut health and growth promoters when used as feed additives in pig production. ADDCON has currently intensified its R&D-efforts in this direction and has recently launched the product range pwrPlanz® as feed supplements for livestock. Specifically, pwrPlanz® EMC (hereafter abbreviated as EMC) is a highly concentrated product, which consists of a mixture of uneven medium chain fatty acids and macro molecules. The distinctive combination of these natural molecules optimizes livestock production, especially due to improved animal performance and animal health status. EMC is efficiently supporting gut health in animals, by a strong antimicrobial effect against pathogen bacteria and improving the gut morphology. This leads to a stabilized gut microbiome - and thus an increased performance.The first laboratory antimicrobial tests (MIC - minimum inhibitory concentration)with EMC showed a strong antibacterial effect of EMC against the most common pathogenic Gram-positive bacteria (Table 1), reproducing similar effects shown with uneven MCFA in-vitro.

Table 1. Minimal Inhibitory Concentration (MIC) of EMC against various swine pathogenic bacteria - results expressed in g/kg

Bacteria	*Streptococcus agalactiae*	*Streptococcus suis*	*Clostridium perfringens*	*Staphylococcus aureus*
MIC in g/kg	0.50	1.25	0.13	1.00

A first in-vivo trial showed that the product has beneficial effects on pigs under challenging farm conditions. The study in piglets with an initial weight of 5.45 kg over a period of 35 days after weaning showed that 0.04% EMC led to an improvement in all production parameters, including feed intake, daily gain and feed efficiency (improvement by 2.2%). Due to the nature of the trial, those data were available pooled only. The biggest impact, however, was seen on the reduction of the mortality rate by more than 70%. Since the field trial could give only pooled data, a statistically sound re-confirmation of the noted impact under field conditions was therefore needed. This was confirmed in a study of 6000 weaned piglets, where the product reduced ($P<0.05$) the mortality of severely infected piglets caused by *Streptococcus suis*. Amoxicillin, as advised by veterinarians, served as positive control with a special permit from local authorities (Figure 1). Results proved a similar impact to the used antibiotic.

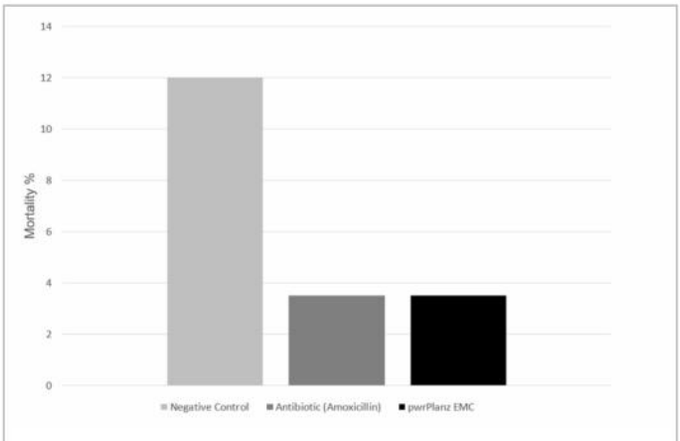

Figure 1: Mortality rate on Spanish piglet farm with Streptococci infection using different feed applications, including EMC

To generate a wider database for recommended use of the product, further trials had been initiated.

A trial took place in a commercial post-weaning piglet farm in Germany, which had a history of continuous Streptococci incidences, controlled by veterinary prescription with Amoxicillin.

Around 13500 piglets have been evaluated over a period of 3 months. Piglets have been weaned with 28 days and the feeding trial itself started at 33 days of age. Piglets had an initial weight of ~7.75 kg and were kept until ~23.5 kg. Mortality comparison of two groups (Positive control: Amoxicillin, as prescribed by veterinarians; Treatment: 0.15% EMC) was carried out on rolling average. Mortality data were statistically analysed and a $P<0.05$ value was considered significant.

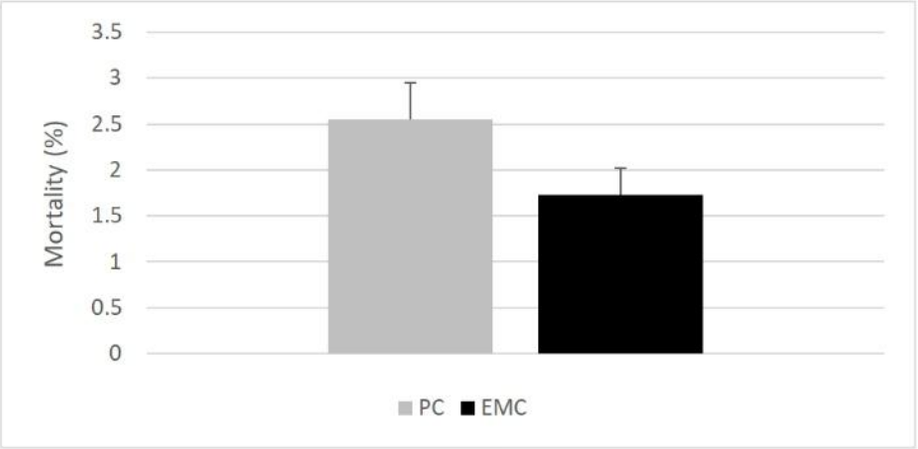

Figure 2: Mortality rate on German piglet farm with Streptococci infection using veterinary prescribed Amoxillin (PC) or 0.15% EMC

During the 3 months trial period, data showed (Figure 2) that the inclusion of 0.15% EMC into the piglet diet led to a significantly (P=0.03) reduced post-weaning piglet mortality by 32%, caused mainly by *Streptococci suis*, against the positive control.

The importance of following up in-vitro assays with in-vivo microbiology testing, as extrapolation should never be assumed, has been pointed out by several scientists. The current research has been able to demonstrate that data achieved in MIC-studies, were able to be replicated under challenging field conditions. The Spanish data, reported first for the VICTAM Feed Formulation Award - Latin America (2025), showed a significant impact of the additive against the negative controlled piglets. The latest German data proved additionally a beneficial impact also against the positive control. In summary, data of the additive show a broad impact against Gram-positive bacteria. EMC might be therefore an important tool in any antibiotic reduction strategies - thus supporting sustainable animal production. The product can be therefore part of the 'One Health' approach of the World Health Organization for reducing the risk of antimicrobial resistances.

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EVENT CALENDER

WORLD PORK EXPO 2026
June 3–4, 2026 | Des Moines, Iowa, USA.

Location : Lowa State Fairgrounds

Description : The world's largest pork-specific trade show, attracting thousands of global producers and industry professionals for seminars and networking.

VIV EUROPE 2026
June 2–4, 2026 | Utrecht, Netherlands.

Location : Jaarbeurs Utrecht

Description : A premier "Feed to Food" world expo covering the pig, poultry, and dairy sectors with a focus on global production trends.

28TH IPVS CONGRESS
(International Pig Veterinary Society)

June 16–19, 2026 | Ho Chi Minh City, Vietnam.

Location : Thiskyhall Sala Convention

Description : The most prestigious global scientific forum for pig health. Key topics for 2026 include combating African Swine Fever, immunology, and AIoT in pig production.

SPACE 2026
Sept 15–17, 2026 | Rennes, France.

Location : Parc Expo Rennes

Description : An essential international meeting point for all animal sectors, featuring the latest innovations in livestock farming and sustainable practices.

15TH WORLD SWINE INDUSTRY EXPO
Oct 22–24, 2026 | Changsha, China.

Location : Changsha International Convention & Exhibition Centre

Description : A massive trade event running alongside the Leman China conference, focusing on the entire pig industry chain from breeding to environmental management.

EUROTIER 2026
Nov 10–13, 2026 | Hanover, Germany.

Location : Hanover Exhibition Centre

Description : The world's leading trade fair for professional animal husbandry, themed "Intelligence in Animal Farming" for its 2026 edition.

Common Pig Diseases in India and their Prevention

Prof. R.N.S. Gowda*

Pig farming in India faces significant challenges from a variety of viral and bacterial diseases that impact productivity and, in some cases, pose public health risks.

A. Viral Diseases

These diseases are highly contagious and often lead to severe economic losses due to high mortality rates and trade restrictions.

- **African Swine Fever (ASF):** A devastating, highly fatal disease (up to 100% mortality) first confirmed in India (Assam and Arunachal Pradesh) in 2020. It has since spread to other states, including Jharkhand and Goa. There is currently **no effective vaccine** available in India.
- **Classical Swine Fever (CSF):** Also known as hog cholera, this is an endemic viral disease in India with a high prevalence, especially in the western region. Unlike ASF, a vaccine for CSF is available and provided for free by the Government of India.
- **Porcine Reproductive and Respiratory Syndrome (PRRS):** A viral disease causing reproductive failure in sows and respiratory issues in piglets. It was first reported in Mizoram and has since been detected in other North Eastern states.
- **Foot-and-Mouth Disease (FMD):** A highly contagious viral disease affecting all cloven-hoofed animals, including pigs, characterized by fever and blisters on the snout and feet. Vaccination programs are in place to control its spread.

B. Bacterial and Other Infectious Diseases

Bacterial infections often occur as secondary complications to viral diseases, further increasing mortality rates.

- **Swine Erysipelas:** Caused by *Erysipelothrix rhusiopathiae*, it presents with fever, arthritis, and characteristic "diamond-shaped" skin lesions.
- **Pasteurellosis:** A major cause of respiratory distress and septicaemia, often part of the Porcine Respiratory Disease Complex (PRDC).
- **Brucellosis:** A zoonotic disease causing abortion and infertility in pigs, with a 2-5% prevalence reported in North East India.
- **Colibacillosis:** Caused by *E. coli*, it is a common cause of fatal diarrhea in newborn piglets, particularly in hilly regions.

C.Common Parasitic Diseases in Pigs

Parasite Type	Common Name	Primary Clinical Signs	Key Prevention & Control
Internal (Worms)			
Ascaris suum	Large Roundworm	Coughing ("thumps"), poor growth, weight loss, and "**milk spots**" on the liver.	Use an all-in/all-out system, steam cleaning, and routine deworming with fenbendazole or ivermectin.
Trichuris suis	Whipworm	Bloody diarrhea (scours), anemia, and emaciation.	Regular fecal monitoring and deworming. Eggs are extremely resilient in soil.
Strongyloides ransomi	Threadworm	Severe diarrhea in piglets (at 10-14 days old), dehydration, and high mortality.	Treat sows with ivermectin 7-14 days before farrowing to prevent transmission through milk.
Metastrongylus spp.	Lungworm	Persistent coughing and labored breathing; often exacerbated in outdoor pigs eating earthworms.	Avoid wet, earthworm-infested pastures; rotate grazing sites regularly.
Stephanurus dentatus	Kidney Worm	Poor growth, liver scarring, and eggs found in urine; primarily affects older breeding stock.	Use concrete floors for farrowing; maintain dry, well-drained lots.

Internal (Protozoa)			
Isospora suis	Coccidiosis	Yellowish or gray watery/pasty diarrhea in piglets aged 1–3 weeks.	Strict sanitation of farrowing crates; thorough cleaning and disinfection between batches.
Balantidium coli	Balantidiasis	Often asymptomatic but can cause diarrhea and intestinal inflammation in immunocompromised pigs.	Good hygiene and minimizing stressors that weaken the immune system.
External			
Sarcoptes scabiei	Sarcoptic Mange	Intense itching (rubbing against objects), crusty skin, and red pimples/lesions.	Regular inspections; treat with topical or injectable acaricides like ivermectin.
Haematopinus suis	Sucking Lice	Restlessness, skin irritation, and anemia; can transmit the swine pox virus.	Insecticidal sprays or pour-on treatments; isolate new stock to prevent introduction.

Zoonotic Diseases (Risk to Humans)

Pigs in India act as reservoirs for several viruses that can infect humans.

1) **Japanese Encephalitis (JE):** Pigs are critical "amplifying hosts" for this mosquito-borne virus, which causes severe neurological disease in humans.
2) **Hepatitis E Virus (HEV):** Pigs are a major reservoir for HEV (particularly genotype 4 in India), which can be transmitted to humans through undercooked pork or contaminated water.
3) **Swine Influenza:** Regular occurrences of various subtypes (like H1N1) are reported, posing potential pandemic risks.

Common Swine Diseases: Signs and Prevention

Disease	Clinical Signs	Prevention Strategies
African Swine Fever (ASF)	High fever, sudden death, loss of appetite, red/purple skin patches (ears/legs), internal bleeding.	No vaccine available . Strict biosecurity, quarantine, disinfection, and culling are essential.
Classical Swine Fever (CSF/Hog Cholera)	High fever, huddling, conjunctivitis, staggering gait, purplish skin patches, and high piglet mortality.	Routine vaccination. Strict sanitation and movement control.
Foot and Mouth Disease (FMD)	Fever, blisters on snout, tongue, and feet; lameness; excessive drooling.	Periodic vaccination (every 6 months in endemic areas). Strict movement control and disinfection.
Swine Erysipelas (Diamond Skin)	High fever, characteristic diamond-shaped red/purple skin lesions, joint pain, and sudden death.	Vaccination (typically at 6–10 weeks). Good hygiene and prompt antibiotic treatment.
Porcine Reproductive & Respiratory Syndrome (PRRS)	Reproductive failure (abortions, stillbirths) in sows; pneumonia and coug hing in piglets.	Biosecurity, vaccination (where available), and using PRRS-free breeding stock.
Swine Influenza	Sudden onset of fever, persistent coughing, sneezing, nasal discharge, and lethargy.	Annual vaccination, proper ventilation, and minimizing contact with birds or humans with flu.
Colibacillosis (E. coli)	Profuse watery yellow/grey diarrhea, dehydration, and high mortality in young piglets.	Sanitation of farrowing pens, ensuring piglets receive colostrum, and strategic vaccination of sows.
Swine Dysentery	Bloody diarrhea with mucus, weight loss, and dehydration.	Rodent control, proper sanitation, and using medicated feed as prescribed by a vet.

General Prevention Tips

- **Biosecurity:** Limit farm visitors, use footbaths, and disinfect all equipment and vehicles.
- **Quarantine:** Isolate new pigs for at least 2-4 weeks before introducing them to the main herd.
- **Management:** Implement "all-in, all-out" systems to break disease cycles between batches.
- **Hygiene:** Ensure clean drinking water and avoid feeding raw kitchen waste (swill), which can harbor viruses.

Disease Category	Key Diseases	Prevention & Control
Highly Fatal (Viral)	ASF, CSF	Strict biosecurity, culling (for ASF), and vaccination (for CSF).
Respiratory/Reproductive	PRRS, FMD, PCV2	Herd isolation, improved hygiene, and vaccination where available.
Bacterial/Enteric	Erysipelas, *E. coli*, Salmonellosis	Antibiotics, improved farm sanitation, and proper feed hygiene.
Zoonotic Risks	JE, HEV, Nipah*	Vector control, public awareness, and food safety measures.

Vaccination Schedule for Pigs

The **Department of Animal Husbandry and Dairying (DAHD)** provides 100% central assistance for critical vaccinations against **Classical Swine Fever (CSF)** and **Foot-and-Mouth Disease (FMD)** under the Livestock Health and Disease Control Programme (LHDCP).

The following vaccination schedule is recommended by the government for pigs:

Primary Vaccination Schedule

Disease	Age of First Dose	Booster/Subsequent Doses	Notes
Classical Swine Fever (CSF)	**3 months** and above	**Annual** revaccination	Fully funded by the central government; mandatory for all healthy, non-pregnant pigs.
Foot-and-Mouth Disease (FMD)	**4 months**	Every **6 months**	Part of the National Animal Disease Control Programme (NADCP).
Haemorrhagic Septicaemia (HS)	**6 months**	**Annual** revaccination	Often administered before the monsoon season.
Black Quarter (BQ)	**6 months**	**Annual** revaccination	Particularly important in endemic areas.

Specific Breeding Stock Requirements

For breeding animals, additional vaccinations are recommended to prevent reproductive failures:

- **Porcine Parvovirus (PPV):** Administered to gilts and sows **before mating.**
- **Swine Erysipelas**
- **:** First dose at 2-3 months, with boosters every 6 months for breeding stock.
- **Brucellosis:** While primarily a focus for cattle, screening and vaccination of breeding herds are encouraged in high-risk areas.
- **Essential Management Practices**
- **Deworming:** The DAHD Pig Brochure recommends starting deworming for piglets at **6-8 weeks** of age and repeating it every 45-60 days for growing pigs.
- **Iron Supplementation:** Newborn piglets should receive an **iron injection** (typically Iron Dextran) within 24-48 hours of birth to prevent anemia.
- **Identification:** All vaccinated animals are typically identified by **ear-tagging** and registered on the Bharat Pashudhan (NDLM) portal to track health history.

In conclusion, swine production is highly vulnerable to infectious diseases that can drastically impact economic viability, with viral, bacterial, and parasitic agents causing significant morbidity and mortality. Key threats like African Swine Fever (ASF) and Classical Swine Fever (CSF) require stringent, non-negotiable biosecurity, while others like Mycoplasma pneumonia and Erysipelas are managed through a combination of vaccination and antimicrobial treatment

(*Former and Founder VC, KVAFSU, Bidar. Former Director IAH&VB, Bangalore, Former Prof and University head, Dept. of pathology, Veterinary College UAS Bangalore)

PIG FARMING

The majority of the people of the North Eastern Region are non-vegetarian and among them a good number of people consume pork. NE Region alone is the home for 38.42% of the total pig population of India. Assam possess highest 1.63 million (15.89%) of the total population of India (10.29 millions).

There is an increasing demand for animal protein in the NE Region. The meat producing animals like sheep, goat and chicken only cannot fulfil the requirement of animal protein. Thus there is a huge demand for pork in this region. Due to some biological advantages like prolificacy, faster growth, short generation interval, dressing percentage etc. the pig plays an important role for increasing meat production in this region. Black coloured pigs like Hampshire, Large black and crosses are more popular among the farmers in Assam. Pig husbandry can become a means of sustenance among the farmers having little landholding with low per capita income.

Some Breeds of Pigs

There are over 400 breeds of pigs. The swine producer of different areas of the United States developed breeds through the tools of selection and controlled mating. The indigenous (Desi) pig although forms the basis of Pig production and can well adapt to different production systems, but their production potential is low. Therefore, improved breeds are now being widely used for grading up the indigenous population, so as to increase the pig production in rural areas.

Indigenous Pigs of Assam

- Black coloured, strong bristles on the neck, back and hind legs.
- Adapted and suited to the poor feeding and managemental conditions provided by rural farmers.
- Indigenous pigs are inferior to the improved pigs in respect of many economic traits like- growth,
- efficiency of gain, carcass weight and reproduction. The crosses of Indigenous pigs with Hampshire or Lor Large Black are popular among the farmers
- for their prolificacy and growth.

Cross bred pigs:

The progeny of exotic and indigenous pigs and crosses of different exotic pigs are commonly known as cross bred pig. These types of cross bred pigs are commonly seen in different places of Assam as well as other states of the NE Region. Such cross bred pig without knowing pedigree is not suitable for breeding purposes. The cross bred of exotic with indigenous pig is quite acceptable to the farmers of Assam due to their production performances under existing managemental systems. A definite inheritance level of cross bred pigs with proper selection and breeding may perform similar type of result of exotic pigs.

Selection of Breeding Stock for Farming

election of breeding stock is the key activity of the farmers. The productivity of a farm depends on both foundation stock as well as on the management. The breeding stock should have the quality of high litter size, strength and vigor of litters, good mothering ability, temperament, grain and feed efficiency of the progeny. The following points are important for selection of a breeding stock -

- Free from disease and physical defects originating from reliable breeders.
- The piglets should be healthy, 3-5 months of age and male female should not be from same parents.
- Selected piglets should be from sows which have consistently farrowed and weaned large litters (more than 8) and have reached market weight in minimum time.

For beginners, a medium size pig farm (a unit of 2 males and 8 females pig) may prove beneficial, however a smaller unit of 1 (Male) + 3 or 4 (Females) can also be ideal. The selection of gilts and boars for replacement should be carried out time to time on the basis of age, type and the performances. Selection of pigs for breeding stock and culling of unwanted animals are the two main processes for success of swine industry.

Selection of gilt

- The farmer should select the breeding stock from different farms and should obtain as much information on the animals as possible.
- The gilts should have sound and strong feet and legs have minimum of 12 evenly spread functional teats.
- The gilts should have adequate length and depth of the body, thick, well-muscled hams and should have a prominent neck.
- Selected gilts should be from sows which have consistently farrowed and weaned large litters, and have reached market weight in minimum time.

Selection of Boar

- The male piglets should be preferably one month older than that of the female
- The piglets should have sound and strong feet and legs.
- The male piglets/ boar should have two equal sized testicles
- The piglets should be from dam, which has consistently farrowed and weaned large litters with efficiency of weight gain and feed utilization.

Breeding

In pig breeding programs, attention is focused on improving two aggregate traits: reproductivity and productivity. Reproductivity refers to the number of piglets born ie litter size at birth. Productive performance refers to the efficiency of meat production which can be judged from a combination of traits like growth rate, feed efficiency and carcass quality.

Heat detection and Mating:

The Indigenous pig attain sexual maturity after 9 months of age while the crossbreds attain after 7 ½ to 8 ½ months of age. The average length of oestrus cycle is 21 days (18-24 days). During the oestrus, the female shows:

- Frequent urination, less appetite, erection of ears and restless
- Characteristic grunt or roar associated with heat
- Swelling, reddening of the vulva and mounting to pen mate.
- Vulvar discharge and immobility (Standing reflex) when normal pressure is applied to the back.
- Boar should be placed on either 2nd or 3rd oestrus cycle of the gilt
- The length of the heat period is 2-3 days and best time for service is 2nd half of the 1st day and 2nd day of heat.
- The female should be double served at 10-12 hours interval and boar should be taken out from the female room. Mating can last upto 3-7 minutes.
- The gestation period is 114 days and can rebreed after one month of the weaning.
- The breeding boar can be used up to 18 months of age while female can be replaced after 4th farrowing.

Artificial Insemination (A.I.)

Artificial insemination is a process in which semen is collected from male animal, processed in the laboratory and finally introduced into the female genital tract with the help of instruments for the purpose of making the female animal pregnant. It can offer better possibilities of health control, reduction in the cost of breeding and management and to extend the usefulness of superior boars to large number of sows.

Time of insemination is the principal factor governing fertility and litter size. The best time of insemination in pig is after 4-6 hours of showing standing reflex (immobility) when normal pressure is applied to the back. Second insemination is suggestive after 10- 12 hours of the first.

Housing

Housing provides shelter and protection. For maximum productivity the following points needs to be considered-

- Pig shed should be constructed on North-South direction on dry and raised ground at communicable place.
- The height of the roof should be 8-10ft. The sidewalls (upto 4ft from ground) of the shed should be constructed with brick and cement plastered and polished. The remaining height (upper 4-6ft.) can be made up of wire/bamboo net.
- The floor should be hard or pucca, non- slippery and sloped (3 cm. slope)
- Feeding and water troughs should be constructed in the pen and the corners of the walls, troughs and drain should be rounded for easy cleaning.
- Provision for creep box should be made in farrowing pen
- Provision for adequate open space for exercise, sufficient water and facility for proper disposal of faeces should be created.
- The individual pens should be of uniform size (80-100 sq ft). Different categories of pig like 1 breeding boar or 1 farrowing sow or 8 growers (2-5 mths.) or 4 fatteners (5 mths. above) or 2 gilts/dry sows can be accommodated in a pen of this size.

Schematic drawing of a pig sty

Showcasing expert insights
for pig producers in Vietnam

NOVUS

NOVUS, the leader in intelligent nutrition, recently brought its Made of More experience to Vietnam through two exclusive, customer-only events designed to inspire and empower poultry and swine producers. The gatherings featured thoughtprovoking presentations from regional and global experts and celebrated the launch of NOVUS' newest publication, Nutrition and Production Strategies for Today's Sows. Attendees heard from two poultry speakers whose insights addressed both current challenges and emerging opportunities in Vietnam's monogastric production systems: Che Minh Tung, PhD, Associate Professor, Nong Lam University, opened the program with Unlocking Potential in Vietnam's Livestock Industry. David Torres, Senior Regional Technical Services Manager-Asia Pacific, NOVUS, presented Intelligent Nutrition for Monogastrics: Enhancing Performance and Feed Efficiency. More events are designed to elevate knowledge and partnerships and ultimately help animals reach their full potential. Attendees left with actionable strategies they can apply to strengthen performance, efficiency, and long-term profitability. The events also served as the regional debut of NOVUS' latest book, Nutrition and Production Strategies for Today's Sows. Featuring chapters on genetics, feeding, breeding, and management from experts around the world, the book is a comprehensive and practical resource for nutritionists, veterinarians, farm managers, and industry advisors working to optimise the health and performance of modern sows. A digital version of Nutrition and Production Strategies for Today's Sows is available at no cost from the NOVUS website.

छत्तीसगढ़ के आदिवासी अंचल में सूकर विकास

सूकर बहुत तेजी से बढने वाले पशु होते है। अच्छे रखरखाव की परिस्थिति में वयस्क मादा सूकर वर्ष में दो बार बच्चे दे सकती ह और एक बार में लगभग 10 से 12 तक बच्च देती है। सूकर के कुल भार का लगभग 65 से 80 प्रतिशत वजन के बराबर मांस प्राप्त हा सकता है। सूकर के पेट में चारा खाने वाले पशुओं के पेट की तरह अमाशय में चार खाने न होकर एक ही सम्पूर्ण अमाशय होता है अतः यह उन पशुओं की तरह भोथरा चारा आदि का उपयोग नहीं कर पाता है, इसलिए सूकर को अधिकतम मात्रा में सान्द्र आहार एवं कम से कम मात्रा में रेशे वाले भोजन (चारा, भूसा आदि) की आवश्यकता होती है।

छत्तीसगढ़ में सभी आदिवासी जातियों के लोग सूकर पालन करते हैं। सड़क से दूर पहाड़ी क्षेत्रों में आज भी ये लोग अपने पारम्परिक तरीकों से देशी सूकर ही पालते हैं जबकि पहुंच वाले गांवों में जहां सरकारी योजनाओं का लाभ मिल चुका है, सूकर पालन में कुछ परिवर्तन आया है।

वहां अब वे ऋण योजनाओं के अन्तर्गत मिलने वाले ''लार्ज व्हाइट यार्क शायर'' और ''मिडिल व्हाइट यार्क शायर'' नस्ल के सूकर भी पालते है।

गांव के अन्य देशी सूकरों की नस्ल भी बदल रही है। प्रायः काले सफेद धब्बों वाले सूकर देखने को मिल जाती है।

बच्चे देते समय मादा सूकर को समूह से अलग रखा जाता है।

मादा सूकर का उपयोग मांस की अपेक्षा बच्चे पैदा करने के लिए अधिक करते है। हालांकि मौका पड़ने पर अनभिज्ञ आदिवासी मादा सूकर का वध करने से भी नहीं चूकते।

दो से तीन माह की उम्र तक बच्चों को अपनी मां का दूध पिलाया जाता है, इस दौरान न तो पिल्लों की बिक्री होती है, न ही माई सूकर की।

पहले पैदा होने वाले पिल्ले को पहले दूध छुड़ाने और अन्त में पैदा होने वाले को कम से दूध छुड़ाने की प्रकिया अपनाना चाहिए, जो कहीं कहीं अपनाई जाती है जबकि अन्य अज्ञानतावश तथा अभावों के कारण इस प्रकिया को नहीं अपना पाते है।

दूध पिलाने की प्रकिया में मादा सूकर बहुत कमजोर हो जाती है जिससे इनकी पसलियां भी दिखने लगती है।

सूकर पालक इन सूकर पिल्लों को जवान होने तक पालने में असमर्थ होते हैं जिसके चार कारण समझ में आते हैं :–

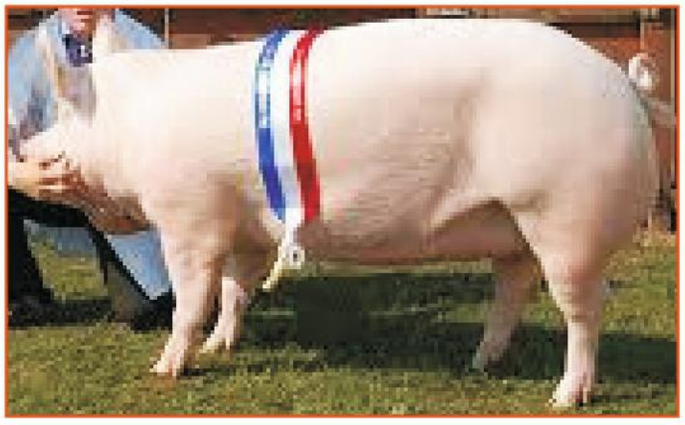
- सूकर आहार पर इनकों पालना उनके लिए एक कठिन कार्य है।
- सूकरों को बाहर छोड़ने पर वे खेतों में खड़ी फसल को नुकसान पहुँचाते हैं, जो आर्थिक हानि के साथ साथ झगड़े का कारण भी बनता है।
- खुला छोड़ने पर कुत्तों एवं अन्य पशुओं द्वारा क्षति एवं गुम या चोरी होने की संभावना रहती है।
- गंदा पानी या चोट लगना उनकी मृत्यु का कारण बनता है।
- समझ–बूझ की कमी के कारण साफ–सफाई की कमी रहती है। हालांकि सूकर की नस्लें के अनुसार साफ–सफाई का ध्यान रखते है।

देशी सूअर की मुख्य नस्ल जो यहां पाई जाती है, उसके मुख्य लक्षण इस प्रकार हैं :–

1. पेट बड़ा और जमीन की ओर लटका हुआ रहता है।
2. इनका वजन विदेशी और क्रॉस सूकरों की नस्लों की अपेक्षा कुछ कम होता है।
3. प्रायः काले रंग के होते है।
4. चेहरा लम्बा होता है और जबड़ा कानों की ओर काफी पीछे तक फैला हुआ रहता है।
5. पीठ पर बहुत कम मांस और चर्बी होती है क्योंकि प्रायः पेट में नीचे की ओर उतर जाती है।
6. बच्चे देने की उम्र जल्दी आ जाती है, लगभग 6 से 8 माह के बीच जवान हो जाती है।
7. वर्ष में दो बार बच्चे देती है।
8. नर सूकर, मादा की अपेक्षा और जल्दी प्रजनन योग्य हो जाता है।
9. कुछ सूकरों की पीठ पर भूरे रंग की लम्बी धारियां पाई जाती है, जो उसकी संबंधी पूर्वजों के जंगली होने का संकेत है।
10. कुछ सूकर संकर नस्ल के भी मिलते हैं जिनमें लार्ज व्हाईट यार्कशायर एवं देशी दोंनो के गुण पाये जाते हैं। सड़क किनारे के गांवो में इस तरह की संख्या अधिक है।
11. लार्ज व्हाईट यार्कशायर एवं मिडिल व्हाईट यार्कशायर के सूकर, जो शासकीय योजनाओं में प्रदाय किये गये हैं वे भी मिलते है।

आज की स्थिति में बिना विदेशी नस्ल के रक्त के कोई सूकर नही रह गया है। हालांकि छत्तीसगढ़ के आदिवासी पहले भी और अब भी देशी काले सूकर को ही पसंद करते हैं।

संकर नस्ल के सूकरों की बीमारियों के प्रति पतिरोधक क्षमता कम



होती है। ग्रामीण परिस्थितियों में इनकी मृत्यु दर भी अधिक है। विदेशी नस्ल के सूकरों में जुंए, पेट के कृमि होने तथा घाव होने पर समय पर ईलाज नहीं होने पर सूकर के ठीक होने की संभावनाएं कम होती है।

स्वाइन फीवर (सूकर ज्वर) नाम की बीमारी का भय रहता है। संकर नस्ल के नर सुकर आहार की अधिक आवश्यकता एवं कम उपलब्धता के कारण धान के खेतों को नुकसान पहुँचाते हैं। ग्रामीाण परिस्थितियों में सूकर पालन के लिए यह भी एक नाकारात्मक बिन्दु हैं। अधिक शारीरिक भार, अधिक वृद्धि दर एवं आहार को मांस में बदलने की तेज क्षमता – विदेशी नस्ल के सूकरों के पालन के लाभ हैं जबकि छत्तीसगढ़ में पारम्परिक सूकर पालन में यह संभव नही हो पाता जहां आहार के नाम पर कों

आदिवासी परिवारों में नर सूकर को खिलाना लाभदायक नहीं माना जाता । विदेशी नस्ल के नर सूकर भारी और बड़े होते है, जो देशी नस्ल की छोटी–छोटी मादाओं से समागम के लिए उपयुक्त नहीं होते। देशी मादा भागने में तेज होती है जबकि विदेशी नर बहुत धीमा होता है। अतः वह गर्मी में होने के बाद भी मादा को पकड़ नहीं पाता।

चूकि नर को आहार कम दिया जाता है। अतः वह धीरे–धीरे कमजोर हो जाता है तथा प्रजनन योग्य नही रहता ।

विदेशी सूकर अपने शरीर भार का एक किलो मांस बनाने के लिए 1. 8 से 2.0 किलो तक सांद्र आहार खाता है, जबकि देशी सूकर 3.5 किलो तक सांद्र आहार खाता है।

चूंकि ग्रामीण परिवेश में साफ सफाई व देखरेख बहुत अच्छे तरीके से संभव नहीं है ऐसी परिस्थितियों में भी देशी सूकरों में प्रजनन क्षमता व बीमारियों से लड़ने की क्षमता अधिक होती है। इसलिए तुलनात्मक रूप से अधिक उत्पादन देना भी उनके लिए सम्भव होता है।

Pig Genetic Resources and their distribution in India

Mani Jeyakumar and Jose Saalom King

Abstract

In India, the indigenous pigs are traditionally reared either by the poor, weaker and the tribal sections of the society. Although, the growth rates and feed conversion ratio of indigenous pigs are less than those of exotic or crossbred pigs, they have unique features like heat tolerance, disease resistance, early sexual maturity and ability to produce meat with less fat. The Indian pig population consists of 29.40% descript pigs, comprising 2.80% exotic, 18.10% crossbred, and 8.20% indigenous pigs, while 70.60% are nondescript pigs which are yet to be categorized for their breed status. Although, the indigenous pigs were largely clubbed as local or non-descript but in the last few years many population have been characterized. So for 14 breeds of pigs have been registered by ICAR-NBAGR as new breeds of indigenous pigs in India. Some of the synthetic pigs were developed by crossing different indigenous pigs with exotic pigs.

Introduction

India is endowed with a large genetic diversity in livestock population, including a varied population of pigs. As of May 2024, fourteen indigenous pig breeds have been identified and officially recognized, with ongoing efforts to characterize the substantial population of nondescript pigs. The Indian pig population consists of 29.40% descript pigs, comprising 2.80% exotic, 18.10% crossbred, and 8.20% indigenous pigs, while 70.60% are non-descript pigs which are yet to be categorized for their breed status. The major population of indigenous pigs is contributed by nondescript pigs which need to be characterized. Apart from the nondescript pigs, there are 14 distinct pig breeds which have been registered as breed in the national database. These indigenous pigs of India are identified as a distinct group due to gradual domestication of wild pigs. These pigs differ in their characteristics from region to region depending on the climatic conditions and topography.

Pig breeds of India

There are 14 registered indigenous pig breeds in India. Indigenous pigs are small in size, potbellied with an elongated face and short ears. The indigenous pig breeds are as follows

1. **Ghoongroo:** Ghoongroo is the first recognized pig breed of India, registered in the national database. These pigs are distributed in the Eastern Sub-Himalayan region of West Bengal, particularly North Bengal especially Darjeeling, Jalpaiguri, Cochbehar, North-Dinajpur and South-Dinajpur districts with an estimated population of approximately 15,000 It is favoured by local communities for its high prolificacy and ability to thrive in low-input systems. These pigs are predominantly black, occasionally displaying white hooves and metapodials. They are characterized by a broad, flattened face and a short, upwardly curved snout. Their large, pendulous, heart-shaped ears resemble elephant ears, making them easily identifiable. Ghoongroo pigs have a distinctive bulldog-like facial appearance. The litter size ranges from 8 to 18 piglets. Both sexes are docile and easy to handle, with females exhibiting excellent fecundity and mothering ability, crucial for piglet survivability.
2. **Niang Megha:** Niang Megha pigs found mostly in the Khasi, Garo and Jayantia mountain of Meghalaya state. The estimated population of these pigs is about 3.9 lakhs. The colour of this pig is generally black but star shaped white at forehead and hock joint may present. The Snout is medium tapering partially white at nostril, Bristle is long on midline and uniformly at other places. Niang Megha is the second registered pig breed in the national database.
3. **Agonda goan:** Agonda goan is the third recognized breed of pig in India. This breed is found in the Tiswadi, Bardez, and Pernem regions of the North Goa district, as well as the Mormugao, Canacona, and Quepem talukas of the South Goa district with an estimated population of 37556. The animals are small, featuring short ears, a short snout, a pot belly, and a wild nature with rough bristles. While the predominant colour is black, some animals exhibit white patches on their legs and face. They are known for being very furious and alert. The large-sized Agonda Goan pig is preferred by locals for its meat, especially during marriages and other festivals. This pig is traditionally known as 'Gavthi Dukor' in Goa. The unique trait of Agonda Goan pig is good mothering ability and lean meat with high palatability.

Registered Breeds of Pig and their Accession Number

S. No	Breed	Home Tract	Accession Number
1.	Ghoongroo	West Bengal	India_Pig_2100_Ghoongroo_09001
2.	Niang Megha	Meghalaya	India_Pig_1300_Niangmegha_09002
3.	Agonda Goan	Goa	India_Pig_3500_Agondagoan_09003
4.	Tenyi Vo	Nagaland	India_Pig_1400_Tenyivo_09004
5.	Nicobari	Andaman & Nicobar	India_Pig_3300_Nicobari_09005
6.	Doom	Assam	India_Pig_0200_Doom_09006
7.	Zovawk	Mizoram	India_Pig_2700_Zovawk_09007
8.	Ghurrah	Uttar Pradesh	India_Pig_2000_Ghurrah_09008
9.	Mali	Tripura	India_Pig_1900_Mali_09009
10.	Purnea	Bihar and Jharkhand	India_Pig_0325_Purnea_09010
11.	Banda	Jharkhand	India_Pig_2500_Banda_09011
12.	Manipuri Black	Manipur	India_Pig_1200_Manipuriblack_09012
13.	Wak Chambil	Meghalaya	India_Pig_1300_Wakchambil_09013
14.	Andamani	Andaman & Nicobar	India_Pig_3300_Andamani_09014

4. **Tenyi Vo:** The Tenyi Vo pig, also known as Votho, Naga Local, or Suho, has breeding tract primarily in the Kohima, Phek, and Dimapur districts of Nagaland with an estimated population of 60,000-70,000 (Breed Descriptor 2016) Descriptor. This breed is named after the Tenyimia communities, including Angami, Rengma, Chakesang, and Zealiang, who are responsible for its breeding. The Tenyi Vo pig is raised mainly for pork production in Nagaland. These pigs are characterized by a long, strong, tapering snout, small erect ears, and bright, alert eyes. The Tenyi VO pig is mostly black in color, with both sexes exhibiting this trait. They have a pot-bellied appearance, with females having a sagging back and pendulous belly that touches the ground. Other distinctive features include a straight tail ending with a white switch reaching the hock joint, white stockings, and white markings on the forehead and ventral body. This indigenous pig has unique traits like well adaptability to its own ecological niche, relatively high disease resistance, can be reared with zero grain production system, in the backyard with household kitchen waste, garbage crop residues, attain early sexual maturity, low feed intake capacity, excellent mothering ability and good meat quality.

5. **Nicobari:** The Nicobari pig, indigenous to the Nicobar Islands, has been reared by the Nicobari tribes since ancient times. Found primarily in the Nicobar District of the Andaman & Nicobar Islands, with an estimated population of 35,000 and this breed is also known as Ha-un or Naut, meaning "pig" in the local Nicobari language. Rearing Nicobari pigs is a symbol of pride and an asset for families, and these pigs play a significant role in the socio-cultural activities and ceremonies of the Nicobari tribes. It is adapted to the natural environment of the Nicobar Islands, which includes rainforests, mountain forests, and plantation areas. Nicobari pigs are mostly black and brown, with some pigs exhibiting creamy-white, reddish-brown, or mixed black and brown colours. They have a sturdy, short, and long body, with a medium to short snout and short erect ears. A marked bristle crest (mane) extends from mid-head/shoulder to the base of the tail. Their facial profile ranges from flat to concave, and they have a short neck with a very large jowl. The tail is notable for its lack of curling. Nicobari pigs are ferocious in nature and some are semi-feral in nature. These pigs are generally raised mostly in the free range and by the Nicobari tribes.

6. **Doom:** The Doom pig, indigenous to Assam, is named after the local 'Doom' community, which has been rearing these pigs for generations. These pigs are found in Agomani, Gauripur, Golakganj blocks and Bilasipara sub-division in Dhubri district and few areas of Bongoigaon and Kokrajhar districts of Assam with an estimated population of approximately 3,000 (Breed Descriptor 2016) [6]. Doom pigs are black in colour and have a short, concave snout. The meat of Doom pigs is lean and highly palatable, fetching a higher price in the market. These pigs are adapted to a migratory scavenging system, requiring minimal inputs. Farmers often move their pigs from place to place in search of food, and some provide housing using low-cost, locally available materials. Doom pigs have a large, flat-bellied body type, short erect ears, and a straight topline with long bristles extending to the thoraco-lumbar area. This pig is well known for quality meat and bristle.

7. **Zovawk:** The Zovawk pig, also known as Mizo local, has breeding tract in the Mamit, Aizawl, Lunglei, Lawngtlai, Champhai, Saiha, and Kolasib districts of Mizoram with an estimated population of about 40000. The meat from this pig is highly preferred by locals. The name 'Zovawk' comes from the Mizo language, where 'Zo' means Mizo and 'vawk' means pig. This breed is well adapted to hilly regions. Zovawk pigs are predominantly black with a white spot on the forehead (star) and occasionally have white patches on the belly and white boots. They have distinctive erect ears, a concave snout, a pot belly, a concave top line, and long bristle along the midline. Zovawk pigs are social animals, rarely staying alone under normal conditions. Historically, they foraged for food in groups and slept together, usually scavenging in and around houses and forest areas, and sleeping under houses in a headto-tail arrangement. These pigs communicate through specific grunting sounds to indicate food, warn of danger, or call their young ones. In the face of danger, the leader emits a loud grunt, causing the group to huddle together in a circle with their snouts outward and the weaker and younger pigs in the centre. This pig is relatively high resistance to diseases and survives well in remote areas where no adequate disease prevention and therapeutic measures are available (Zosangpuii et al. 2020) [17] .

8. **Ghurrah:** These pigs are native to the Bareilly division and adjoining parts of the Lucknow division in Uttar Pradesh. Also known as Deshi or Bareilly Local, they produce a peculiar sound called "Ghur," which is why they are named Ghurrah. These pigs are primarily black, though some are greyish-black or brownish. They are medium-sized with flat bellies, angular bodies, and long straight snouts. Their legs below the hock joint are white, and a thick line of hair runs from the neck to the shoulders. They have elongated heads with triangular faces and short, leaf-shaped, vertically erected ears. The farmers prefer Ghurrah pigs for their disease resistance, hardiness, and adaptability to local conditions. These pigs can withstand dog attacks and protect their piglets without harm.

9. **Mali:** The Mali pig is native to the Dhalai and North districts of Tripura. These pigs are generally black with starshaped white patches on their foreheads. They are mediumsized with pot bellies and medium to small bristles distributed throughout their bodies (Dandapat et al. 2010) [8]. Mali pigs are characterized by their short, erect ears lying perpendicular to the body axis and a concave snout.
10. **Purnea:** Purnea is the first registered pig breed from Bihar and Jharkhand. This black-coloured, medium-sized pig is primarily found in the Purnea and Katihar districts of Bihar and the adjoining areas of the Sahibganj district in Jharkhand. Purnea pigs have compact bodies and pot bellies, with some individuals displaying white spots on their lower limbs. These pigs are characterized by round faces, short conical and erect ears, and small, thick, slightly concave snouts. Their skin is thick, with neck folds in mature animals, and they have a ferocious nature. The thick line of bristle is present from neck to shoulders. A thick line of bristles runs along the top line from the neck to the shoulders, giving the pigs a wild appearance.
11. **Banda:** The breeding track of Banda pig is Jharkhand. These pigs are black coloured, having short and erect ear. These pigs have a long and concave snout, medium to short bristle on neck. Banda is small sized pig, with typical 'wild look' and highly ferocious. Coat colour is mainly black or dark grey. Distinguishing features included body covered with thick hair, especially on poll and neck, small but elongated snout, small erect ears. Also having specific burrowing nature. These physical conformation traits are true breed characters and do not match with any of the recognised indigenous pig breed. The pork is leaner and tastier and highly preferred for its taste by local people.
12. **Manipur Black:** The breeding tract of the Manipuri Black pig is in the state of Manipur. These medium-sized pigs are predominantly black, although grayish-black body coats and white patches on the extremities can also be seen. They have a medium-sized, concave, dish-shaped head, a short slightly upward-curved snout, a well-built long body with short legs, and a prominent neck. Both males and females are covered with short hair.
13. **Wak Chambil:** The breeding tract for this pig spans the various districts of the Garo Hills division, including North, East, South, West, and South West Garo Hills of Meghalaya. Wak Chambil pig is one of the unique and well adapted indigenous pig reared under low input backyard production system in the eastern Himalayan hill ecosystem. These pigs are small, predominantly black and white in colour, and possess well-built, compact body structures with short limbs. They have small heads, small eyes, medium snouts, small erect ears, and small hooves that touch the ground less frequently. Their pendulous bellies further distinguish them from other pig breeds. These pigs have a smaller body size, an adequate growth rate, and lower litter performance compared to other indigenous pigs of the northeastern region.
14. **Andamani:** This pig is distributed across various islands in the Andaman group of islands. They are sturdy, mediumsized pigs that are black or brownish in colour. They have short to medium snouts and short, upward-erected ears. The most commonly observed feature is a slight downward arch or curvature of the back.

Indigenous Breeds of Pigs

Ghoongoo

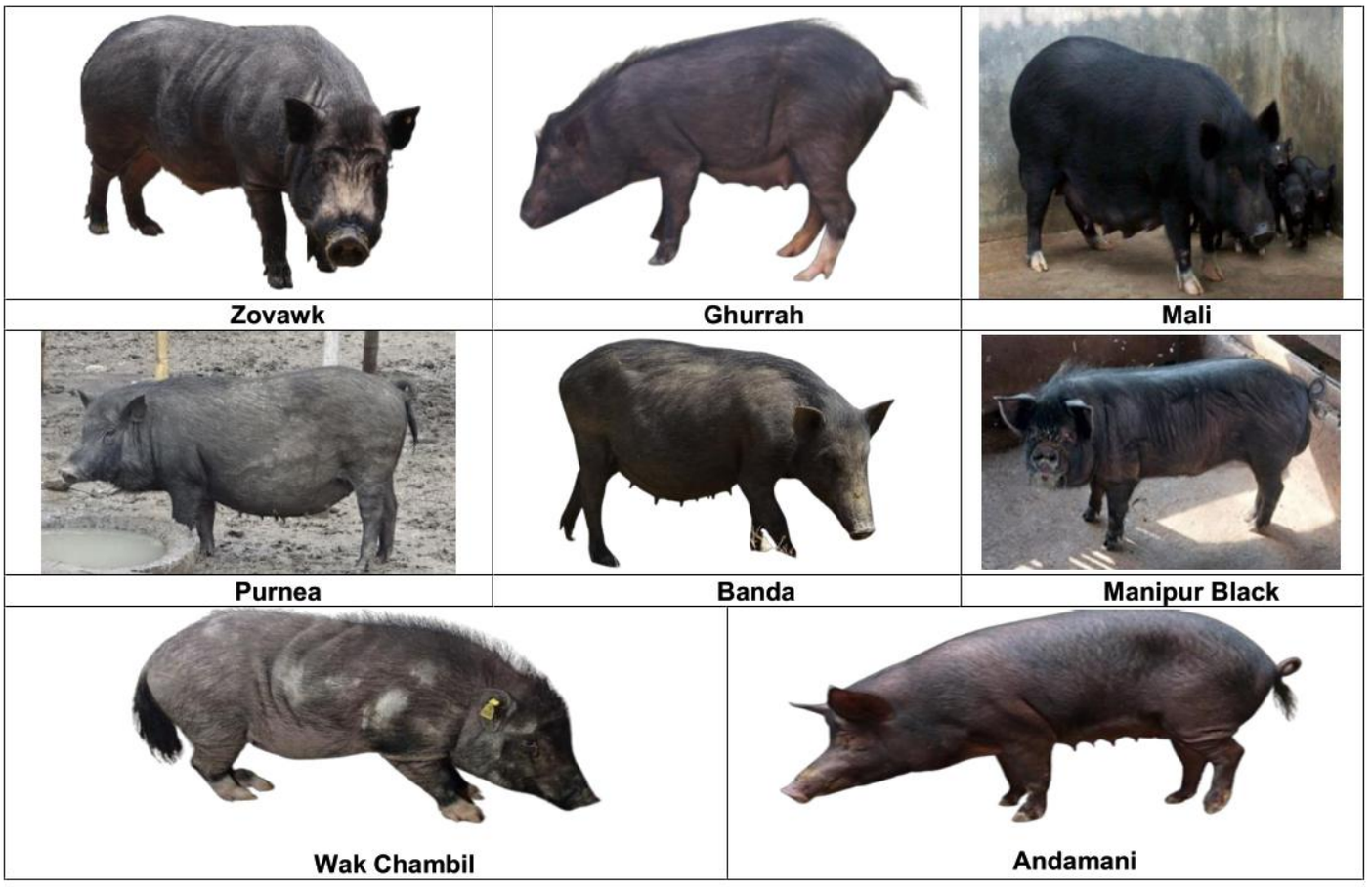
Niang Megha

Agonda goan

Tenyi Vo

Nicobari

Doom



Other population of indigenous pigs of India

Besides, the above described registered breeds, some other population of indigenous pigs have been described

1. **Ankamali:** The Ankamali pigs are black and rusty grey with white patches. The body is small, compact with a little bulge at the belly. The face is long with tapering snout. A distinct bulging can be clearly seen at the joint of the jaws. The back is slightly concave. They attain a body weight of around 37 kg by 8 months. They derive their name from a place of the same name near Ernakulum. These pigs are found predominantly in Kerala and also distributed in Karnataka and Tamil Nadu.
2. **Dome:** The Dome pigs are distributed in North and South districts of Tripura. Their colour varies from black to grey with long thick crest of bristles at dorsal line from neck to trunk.
3. **Golla:** These pigs take their name from Golla community of Ganjam district of Odisha that traditionally rear them. They are medium sized.
4. **Lepchamoun:** The Lepchamoun pigs are reared in the Sikkim. They are medium sized. The ears are drooping type.

Indigenous pigs of Tamil Nadu

Kumar et al. (2017) has described the local pigs of Tamil Nadu. These are small sized pigs.The predominant colour is black. The small percentage of animals has white or brown patches. The Legs are white below the hock joint. The ears are leaf like and drooping. The tail is pendulous type with a tuft of hairs at the tip. Belly is mostly flat. These pigs are reared predominantly under scavenging management systems with occasional tethering.

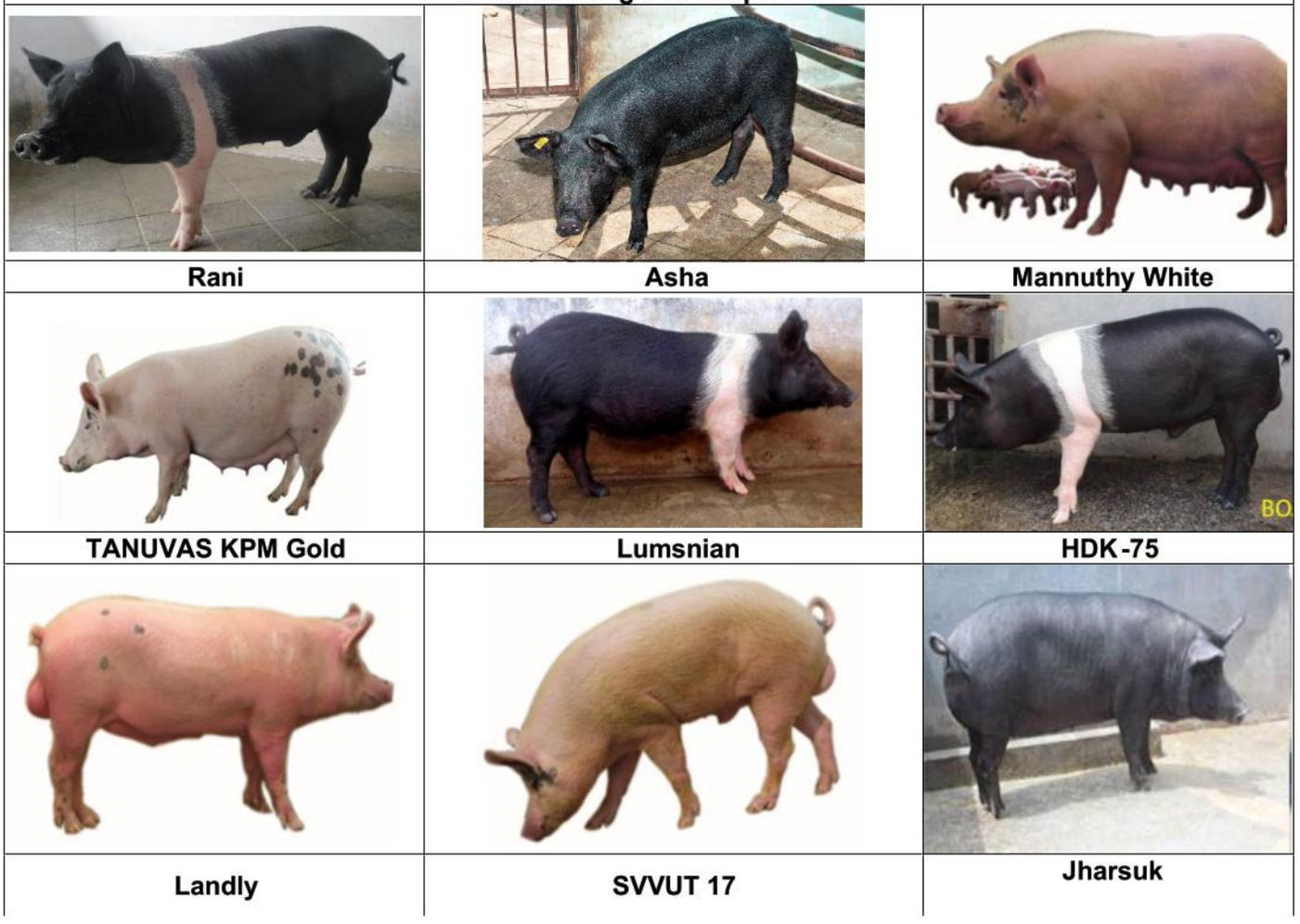
Crossbred pigs

Crossbred pigs have been developed by crossing different indigenous pigs with exotic pigs and continuous selection over the generations. There are 9 crossbred varieties developed by ICAR-NRC on Pig and different AICRP centres present in different regions of the country. These crossbreds have better production and reproduction performance than the indigenous pigs. The crossbred's pigs are preferred by commercial pig farming system.

1. **Rani:** Rani crossbred pigs were developed at ICARNRC. These pigs were developed for north eastern region of India as breeder pigs
2. **Asha:** Asha crossbred pigs were developed at ICARNRC on Pig by crossing Rani Sow with Duroc terminal sire with 75% total exotic inheritance. These pigs were developed for north eastern region of India as finisher pigs.
3. **Mannuthy White:** These crossbred pigs were developed by AICRP unit at Kerala by crossing LWY boar with female local pig of Kerala with 75% exotic inheritance.

4. **TANUVAS KPM Gold:** These crossbred pigs were developed by AICRP unit at Tamil Nadu by crossing LWY boar with female local pig of Tamil Nadu with 75% exotic inheritance.
5. **HDK-75:** These crossbred pigs were developed by AICRP unit at AAU, Khanapara by crossing Hampshire boar with Doom sows with 75% exotic inheritance.
6. **Landly:** These crossbred pigs were developed by AICRP unit at IVRI, Bareilly by crossing Landrace boar with Ghurrah sows with 75% exotic inheritance.
7. **SVVUT 17:** These crossbred pigs were developed byAICRP unit at Andhra Pradesh by crossing LWY boar with female local pig of Andhra Pradesh with 75% exotic inheritance.
8. **Jharsuk:** These crossbred pigs were developed by AICRP unit at Jharkhand by crossing Tamworth boar with female local pig of Jharkhand with 75% exotic inheritance.

Crossbred Pigs Developed in India



Conclusion

India boasts a rich genetic diversity of indigenous pig breeds, with 14 officially recognized breeds and a significant population of nondescript pigs yet to be characterized. These indigenous breeds, adapted to various climatic and geographical conditions, exhibit unique traits that contribute to their survival and productivity in local farming systems. The ongoing efforts to characterize these breeds and enhance the understanding of their genetic resources are crucial for improving livestock management and ensuring sustainable livelihoods for farmers. By preserving and promoting these indigenous pig breeds, India can strengthen its agricultural biodiversity and enhance food security while supporting the cultural heritage associated with pig farming in different regions.

Breeding for All-round Robustness

Lizette Vestergaard Horndrup
Knowledge & Communications Specialist, DanBred

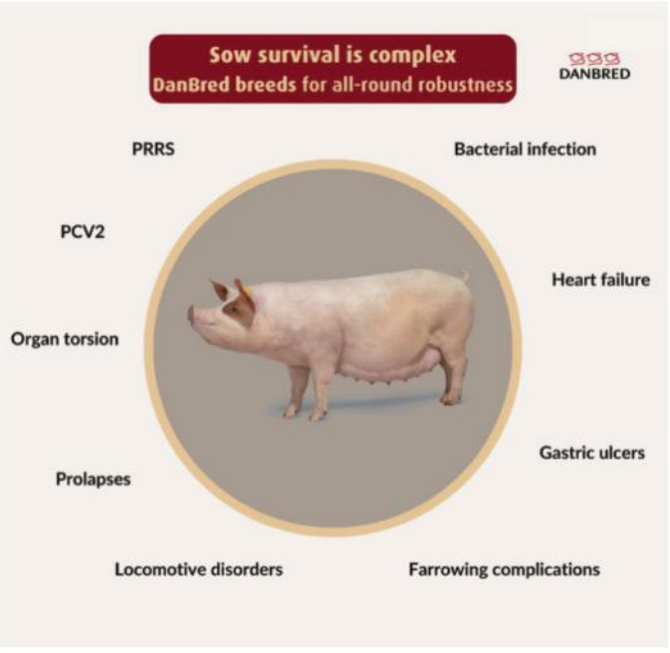
I mproving pigs' productivity through vital robustness has become a key objective in modern breeding. Programmes today aim to deliver new generations of pigs that are stronger, more resilient, and able to perform under diverse conditions.

A focus on fundamental traits such as feed efficiency, survival and reproduction within the breeding goal ensures maximum genetic progress for pig producers to benefit from.

To some, a breeding goal focused on these traits might seem too straightforward. But this simplicity is intentional. By concentrating on traits that directly impact productivity and robustness, maximum genetic progress can be achieved for each trait.

Robustness and global pig production

Breeding for robustness has a significant influence on global pig production, ensuring healthy and resilient pigs throughout their productive life. With remarkable productivity increases in pigs over the last decade, robustness has become even more important. A balanced breeding goal ensures consistent genetic progress in both robustness and productivity. A balanced breeding goal emphasises improved performance while also prioritising survival and conformation. These directly enhance the overall robustness of pigs.



By breeding for survival, robustness can be increased by selecting for stronger immunity and resilience, supporting greater health and increased longevity in both sows and piglets.

Achieving maximum genetic progress for robustness

Robustness covers a range of traits, including productivity and health-related factors linked to challenging environments or changes in conditions. It reflects the ability to adapt effectively to such challenges. Various breeding goal traits can be defined to improve robustness.

Some breeding programmes dilute genetic progress by spreading focus on a broad range of traits or focusing too narrowly on specific environments or diseases. All these traits serve as indicators for a specific goal.

For example, breeding for an indicator trait such as birth weight, trying to enhance piglet survival instead of breeding directly for piglet survival to ensure maximum genetic progress for the trait. Having a targeted breeding goal implies to breed for the aim - in this case more surviving piglets regardless of the reason or cause of mortality. Genetic progress is not unlimited, and success cannot be measured simply by the number of traits included in a breeding goal. Including too many traits can dilute progress across all of them. Achieving genetic progress depends on the quality of phenotypic data, selection intensity, and the precision of statistical models used to predict breeding values and identify the best animals for future generations.

Geneticists identify and prioritise breeding goal traits by balancing the number and weighting to maintain focus and achieve maximum genetic progress.

A simple approach with direct impact

Danbred's breeding goal may appear simple, and that is by intention - simplicity often drives strong results. By focusing on the core traits that directly drive results in the herd, genetic progress can be achieved faster and more effectively. A target breeding approach is built on a foundation of survival-based selection to enhance robustness in pigs, ensuring they thrive under diverse conditions while maintaining strong production performance.

Prioritising traits such as survival and conformation supports the development of robust pigs with high survival rates and improved overall health. A targeted approach centred on simplicity enables maximum genetic progress and ensures measurable production outcomes for pig producers. This enables producers to apply genetic advancements effectively within their own herds.

In 2024, DanBred implemented a new breeding goal trait for sow survival. This marked the first time a genetic company started using data from commercial herds to drive genetic improvements. This innovative method for measuring sow survival covers the sow's entire productive life - from first mating to eighth parity.

By breeding for sow survival, we breed for overall robustness. Sow survival has shown remarkable progress, improved with up to ten percentage points across the three DanBred purebred populations. This breeding progress is expected to be reflected in the commercial production herds within the next couple of years.

Weaning —Arming the Piglet to Survive in Hostile Environment

Ricardo Neto

Weaning is one of the most stressful events in a pig's life. The abrupt transition from sow's milk, a liquid diet, to a solid feed, combined with environmental and social changes, places immense pressure on the gastrointestinal tract (GIT). This combination of factors often leads to compromised gut integrity, increased susceptibility to pathogens, and poor growth performance.

An intervention that allows us to support the piglets in this transition and challenging period is the beta-1,3-glucans (B-1,3-G), naturally occurring polysaccharides with immunomodulatory properties that have been shown in different species, including pigs and humans, to support gut health and immunity, supporting the ability of the piglet to overcome this period. Here, we will examine the challenges the piglets face and how B-1,3-G can help them overcome them. Looking into more detail as to how the weaning period impacts the pig's gut health, we can see this challenging period causes abrupt changes in the gut, both structurally and functionally.

In nature, due to the much later and gradual change of diets (from milk to solids), the gradual exposure to pathogens and no change of environment, the microbial population of the gut has time to adapt, both to the new diet but also to the pathogens he will be exposed, as exposure will happen gradually and maternally derived antibodies will wade off as immunity will be gradually built up by natural exposure in the environment.

These challenges can be split into:

1. Structural and Functional Challenges

The change from milk to solid feed causes significant morphological and functional changes in the intestine:

- **Villus Atrophy and Crypt Hyperplasia:** Reduced nutrient absorption also leads to the passage of undigested nutrients, which may lead to the growth of pathogenic bacteria, such as E. coli (ETEC).
- **Enzyme Deficiency and Insufficient acid production in the stomach:** may lead to bacterial fermentation in the large intestine and consequent post-weaning diarrhoea
- **Intestinal barrier:** Increased intestinal permeability leads to "leaky gut" and systemic inflammation, increased intestinal permeability, leading to losses of nutrients and easier entry of toxins.

These changes compromise digestion and open the door to pathogens and toxins.

2. Gut microbial population changes

Weaning disrupts the gut microbiota, leading to proliferation of undesirable bacteria, such as Escherichia coli and Salmonella.

3. Immunity landslide

The weaning coincides with the decline of maternally derived antibodies and exposure to new pathogens to which the piglets need to develop immunity.

Supporting interventions

These challenges often lead to the use of antimicrobials; reduction of antimicrobial use is one of the targets of the European One Health Action Plan and farm-to-fork strategy, and it aims at reducing the sales of antimicrobials for farmed animals and in aquaculture by 50% by 2030.

Due to the multifactorial challenge that weaning poses to the piglets, pig veterinarians and stockkeepers need to implement interventions that allow the piglets to be more resilient.

Many nutritional interventions have been explored to support the piglets' immune system and allow them to face challenges better in the post-weaning period and enhance piglet resilience. Beta-1,3-glucans have caught the attention of the scientific community for their immunomodulatory potential, in particular from Euglena gracilis, a highly bioactive Beta-1,3-glucans source (B-1,3-G) (Aleta, Kemin industries) that has previously demonstrated to have immune- modulating effects.

Once in the piglet's body, macrophages and dendritic cells promptly capture B-1,3-G structures. In response to binding B-1,3-G, immune cells will become more active in engulfing, killing and digesting invading pathogens and will initiate a signaling cascade stimulating the attraction, formation and activation of other immune cells. This algae B-glucan influences and modulates cytokine and chemokines. The production of IL-6 (a pro- and anti-inflammatory cytokine), IL-10 (an anti-inflammatory cytokine), and IL- 18 (a pro-inflammatory cytokine) has been shown; both pro-inflammatory and anti- inflammatory cytokines are secreted in response to this specific beta-glucan, leading to a balanced immune response: activation but no overstimulation of the immune system (which would result in inflammation).

Several studies have been carried out, which support the beneficial effect of supplementing piglet diets with B-1,3-G of Euglena gracilis source. To start by assessing the impact of B-1,3-G in piglet intestinal integrity and immune function, a trial was carried out, which included eighty 21-day-old piglets fed either a control basal diet (Corn-soybean meal-based feed with no supplementation) or the same diet supplemented with 200g/t of B-1,3-G of Euglena gracillis. The trial had a duration of 35 days.

	Control	β-1,3-GL	β-1,3-GH
treatment	Basal diet	Basal diet+ 54g β-1,3-G/t feed	Basal diet+ 108g β-1,3-G/t feed

Table 1. Summary of the trial treatment groups.

The villi length in the duodenum and jejunum was assessed, and the levels of IgA and TNF-a. At 56 days of age, the average villi length in the control Group was 175m; for the B-1,3-G supplemented group, the villi length was 250um. The difference between groups was significant ($p<0.05$); a summary of the results is shown in Fig. 1.

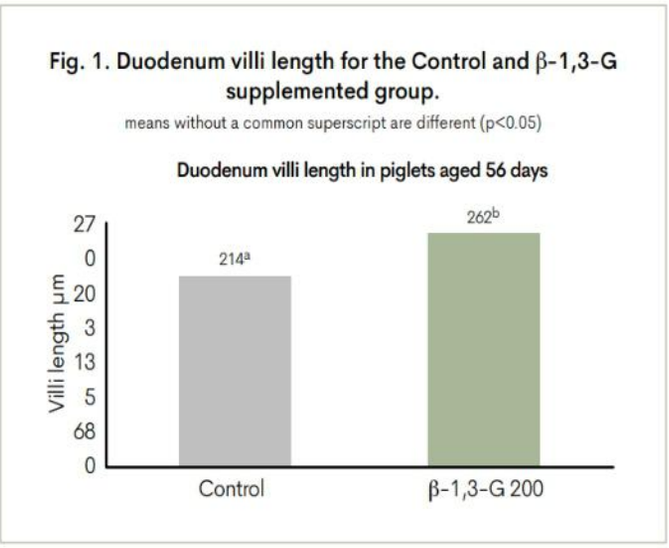


Fig. 1. Duodenum villi length for the Control and β-1,3-G supplemented group.
means without a common superscript are different ($p<0.05$)

Supplementation with B-1,3-G also significantly increased serum levels of both TNF-a. and IgA ($p<0.05$), indicating enhanced innate and acquired immune responses in weaned piglets. The remarkable increase in villi length, which can be used as a key biomarker for intestinal health, suggests enhanced nutrient absorption capacity and gut development in the B-1,3-G group.

With benefits demonstrated in piglets' intestinal development and immunity, another trial was carried out to further focus on local humoral (antibodies) protection. This study was carried out in commercial conditions in Germany, where 480 piglets were included in the study in 16 compartments with 30 piglets for a duration of 53 days. The piglets were allotted to either a control group, receiving the commercial basal diet, or the basal diet supplemented with B-1,3-G at 200g/t.

At days 25 and 53, IgA in faeces (pooled samples) was measured. A significant increase ($p<0.05$) was observed in the B- 1,3-G supplemented group; a significant increase was not observed in the Control group at days 25 and 53. Such an increase was not observed in the control group; a summary of the results can be seen in Fig. 2.

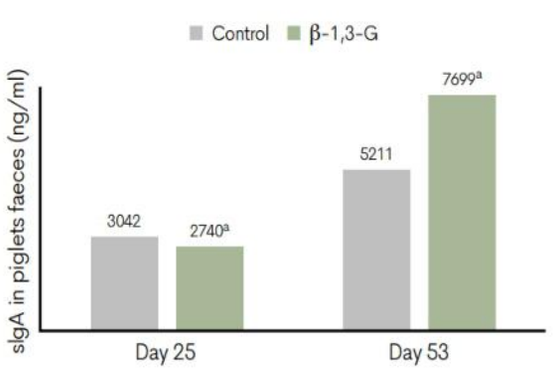


Fig. 2. Secretory IgA (sIgA) in piglet faeces (ng/ml).
means without a common superscript are different ($p<0.05$)

In this study, supplementation with B-1,3-G resulted in an enhanced protection of the intestinal wall through a significant increase in IgA. With intestinal protection being demonstrated and the positive impact of B- 1,3-G in the piglets' intestinal development post-weaning, and improved immunity being demonstrated, it was important to assess the impact of those improvements in a situation of challenge by a common pathogen in the post-weaning period.

A trial was conducted at the University of California, Davis, USA, including 36 piglets of 21 days, with an average body weight (BW) of 7.69 + 0.77kg. The study had a duration of 17 days (5 days of adaptation and 12 days post- infection). The piglets were randomly allotted to one of three treatment groups. A control group, in which piglets were fed a basal diet without spray-dried plasma, antibiotics, and zinc oxide. A second group supplemented with B-1,3-GL, the Basal diet supplemented with 54g of B-1,3-G/t/t of feed and a third group, B-1,3-GH, fed the basal diet supplemented with 108g of B,3G/t of feed. A summary of the trial design can be seen in Table 1.

After 5 days of adaptation, all pigs were orally challenged (day 0) with 3mL (1010 CFU) of F18 E. coli (U.IL-VDL # 05-27242) for 3 consecutive days. The diarrhoea score of each pig was assessed daily, with the score ranging from 1 (normal faeces) to 5 (watery diarrhoea). The frequency of diarrhoea was calculated as the percentage of the pen days with diarrhoea score 3 or greater.

Blood samples were collected before challenge (day 0), and on days 2, 5, 8, and 12 post challenge, the samples were used for measuring total and differential blood cell count, assessment of acute phase proteins, cortisol levels and T cells. 6 piglets from each treatment were randomly selected and euthanised on d 5 post challenge and the remaining piglets were euthanised at day 12 post challenge. Ileal samples were freshly collected from pigs in the control group and the Aleta group for gut

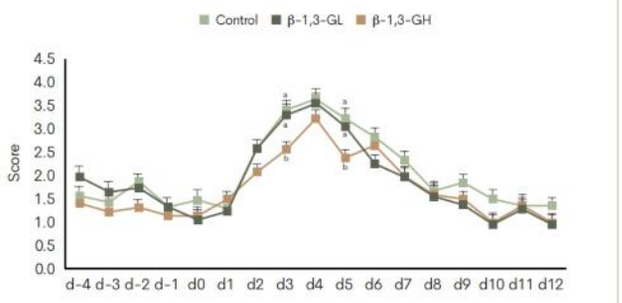


Fig. 3. Daily diarrhoea score of weaned pigs in the different groups.

1, normal faeces, 2, moist faeces, 3, mild diarrhoea, 4, severe diarrhoea, 5, watery diarrhoea. means without a common superscript are different (p<0.05)

permeability analysis.

Piglets included in the group B-1,3-GH ($p<0.05$) had an increased percentage of CD8+ T cells (cytotoxic T lymphocytes, these, respond to antigenic stimulation by proliferating, secreting cytokines (IFN-y, TNF-a) and killing target cells such as cells infected with a virus) at day 5 post challenge and reduced ($p<0.05$) percentage at day 12 post challenge compared with the Control group.

Supplementation with B-1,3-GH also led to the reduction of TNF and increase in IL-10 (anti-inflammatory cytokine)), enhanced immune responses, reduced cortisol (marker for stress) and haptoglobin (an APP used as a marker for inflammation) and upregulated MUC2 in ileal mucosa (resulting in increased production of Mucin, key for gut protection) and Dectin (a membrane receptor that plays a very important role in activating and modulating the immune response).

As a result of the better control of the inflammatory processes and better, more prompt and more robust immune response, as well as better but integrity, piglets included in the group B-1,3-GH had a reduced ($p<0.05$) E. Coli diarrhoea score at day 3 and 5 post challenge and a reduced ($p<0.05$) frequency of diarrhoea (17.28%) for the entire experimental period, compared with pigs in the control (29.01%).

A summary of the daily diarrhoea score in e different groups can be seen in Fig. 3.

With clear improvements in intestinal evelopment in the post-weaning period, improved local and systemic immunity resulting in improved control of diarrhoea in the face of an E.coli challenge, it was important to assess this intervention in production, particularly in the challenging conditions of large-scale production systems To assess the impact of supplementing post-weaning piglets' diets with B-1,3-G of Euglena gracilis origin, a large-scale trial was carried out in the USA, with 300,000 piglets from 3 different sow farms in multiple rooms of 9 different nursery sites. Piglets were weaned at 18-20 days of age.

The study was carried out for 10 months, from February to November. The piglets were allotted to a Control group (227,045 piglets) fed 3 phase basal commercial diets (phase 1 (day 0 to 5), phase 2 (day 6 to 12) and phase 3 (day 13 to 26)), the control group was treated with Chlortetracycline and Tiamulin in phase 2 and the remaining 75,366 piglets were included in the B-1,3-G group, the diets in phase 2 and 3 were supplemented with B-1,3-G at 200g/t. ADG, ADFI, F/G, mortality and liveability were recorded by room.

Final weight was higher for the B-1,3-G with 22.8kg versus 22.6kg in the Control group and took 1 less day to reach the end of the nursery stage (41 vs 42 days), this was the result of a significantly higher ADG in the B-1,3-G group, 420g/day vs the control group, 400 g/day, with the B-1,3-G having an improved FCR, 1,4 vs 1,42 in the Control group.

The performance results can be seen in Fig. 4. The mortality for the study period was 2.36 % in the B-1,3-G, significantly lower ($p<0.05$) than in the Control group, 2.75%. The results for mortality can be seen in Fig. 5.

Conclusion

Weaning presents significant gastrointestinal and immunological challenges for piglets. Supplementation with B-1,3-G, has demonstrated clear benefits in supporting intestinal health and immune function. Multiple studies show improvements in villi length, IgA levels, immune cell activity, reduced incidence of diarrhoea and mortality.

These effects translate into better nutrient absorption, enhanced resilience against pathogens, and improved overall performance during the critical post-weaning period. Incorporating B-1,3-G into piglet diets offers a promising, science-backed strategy to reduce reliance on antimicrobials and support sustainable pig production.

References are available from the author on request

Ricardo Neto

Product Manager, Kemin

Managing the gut as an engine for productivity and health

Swine performance is often discussed in terms of genetics, production efficiency and reproduction. Yet, the gut itself drives these results. More than a digestive organ, it acts as a highly dynamic "factory", a production system responsible for nutrient transformation, immune regulation and microbial metabolism. When this internal production line falls, every downstream process suffers substantially, affecting overall pig health and production performance.

At A&P Nutrition, we view the gut microbiome as the engine of this system. It determines how efficiently energy is transformed, how well pathogens are controlled and how resilient the animals remain under stress. Understanding and managing this ecosystem is not a luxury - it is essential for sustainable, predictable performance and demands a multifaceted nutritional strategy: one that protects, stabilises and optimises microbial function from different angles.

Safeguarding the base: mycotoxin control across all stages

Every production process starts with a stable base. In pig production, that foundation is safe feed. Mycotoxins are hidden stressors in the raw materials of compound feed that even at low, apparently subclinical levels, damage the gut lining and disturb the microbial communities. They can inhibit beneficial bacteria by shifting the milieu in the intestine in favour of opportunistic pathogens. Damage accumulates over time, ultimately hindering performance with various symptoms.

For example, the Fusarium mycotoxins deoxynivalenol (DON) and zearalenone (ZEN) can induce notable shifts in intestinal microbiota composition, including reductions in beneficial fibre-fermenting bacteria (e.g., Ruminococcaceae) and increases in other taxa during toxin exposure.

Similarly, fumonisin B1 (FB1) has been shown to alter the porcine gut microbiome; chronic FB1 intake can decrease overall microbial diversity. Even aflatoxin B1 (AFB1), primarily known for its hepatotoxicity, adversely affects the gut ecosystem, diminishing beneficial Lactobacillus populations while promoting the growth of opportunistic bacteria like Escherichia coli.

These toxin-induced microbial shifts are thought to contribute to intestinal inflammation and nutrient malabsorption in pigs, highlighting that mycotoxin exposure can significantly influence gut microbiota and overall swine health.

A sophisticated, multi-compound solution provides a multilayered approach to these threats. By combining adsorption, remediation and liver-supporting components, it reduces the bioavailability of multiple contaminants significantly. Beyond direct contaminant neutralisation it supports mucosal integrity and maintains microbial balance, creating a stable foundation for the gut.

Establishing a baseline starting on feed level is essential for nutritional interventions following to rely on an intact and resilient intestinal environment. In one trial in Germany, post-weaning piglets were challenged with a high dose of DON and ZEN for 42 days. Challenge increased FCR significantly, but the detrimental effects of mycotoxins on FCR were completely alleviated with inclusion of Mycoraid (Figure 1).

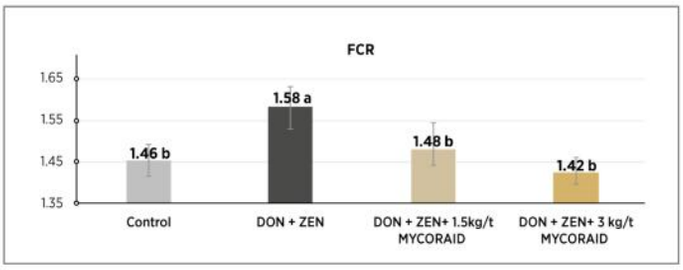


Figure 1 - Effect of a multi-component mycotoxin management product on alleviating FCR increase resulting from DON and ZEN challenge in piglets.

Multilayered mycotoxin management lays the groundwork for a functional "production" starting at the "raw material", the feed. This stable foundation unfolds its full effect during the whole process. Although it is not aimed at stimulating growth directly, it mitigates losses and supports the proper functioning of downstream processes, including lactation and growth.

Feeding the system: Eubiotic lignocellulose as the fuel

Once the base is secured through feed safety, the next point of focus is the active support of the intestinal microbiome. A balanced microbiome is central to gut health and this, a central turning point to maintaining systemic health.

This concept can be illustrated in sow management which not only aims at the sow's own performance but also at creating the best possible starting conditions for her offspring. Fueling the sow's microbiome is a key factor to reach this goal. Nutritional strategies that support commensal microorganisms are critical.

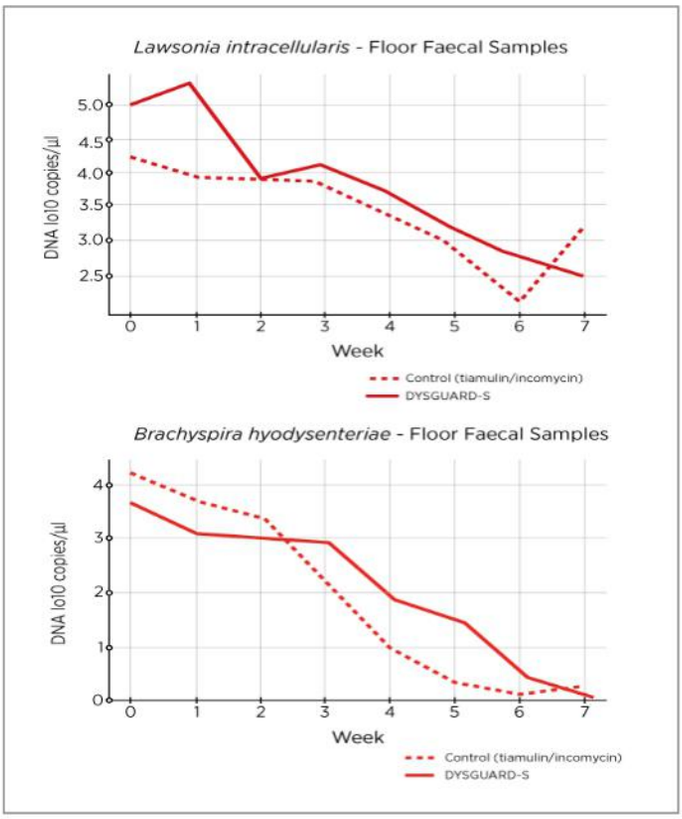


Figure 3 - The reduction of Lawsonia intracellularis and Brachyspira hyodysenteriae loads over time, comparing antibiotic and essential-oil-based feeding.

The results underline the dual potential of specific essential oils, targeting microbial imbalances while supporting epithelial integrity and performance. In practice, this means not only fewer clinical losses but also growth performance and a tangible step toward antibiotic-free production in swine herds.

Reducing inflammatory stress - the lignan effect

While each phase addresses specific functional needs, metabolic stability is a requirement to keep the engine "smooth" across all stages. So, the final step is maintenance and keeping the system efficient and resilient in the long term, like a "well-oiled machine".

Chronic low-grade inflammation triggered by various factors is one of the most underestimated productivity drains: it diverts energy towards immune defense, increases oxidative stress and gradually alters the microbial balance by altering the environment in favor of opportunistic pathogens.

Wood lignans provide subtle yet pivotal support. With their anti-inflammatory and antioxidative properties they help maintain stability with several levers: reduce inflammatory pathway activation, help the gut lining to "stay in shape", maintain microbial balance, all leading to a more stable, consistent performance across all stages. They act as the "engine maintenance" in the production process safeguarding performance by supporting metabolic balance even amid stressful conditions.

In sows, metabolic stability ensures high reproductive performance as well as appropriate milk yield. In fattening pigs across stages feed conversion remains one of the most sensitive indicators of efficient production, even slight improvements reflect measurable savings and thus profitability. In a series of pig trials, a supplementation of wood lignans resulted in an improved feed conversion translating in steadier growth curves and less fluctuations (Figure 4).

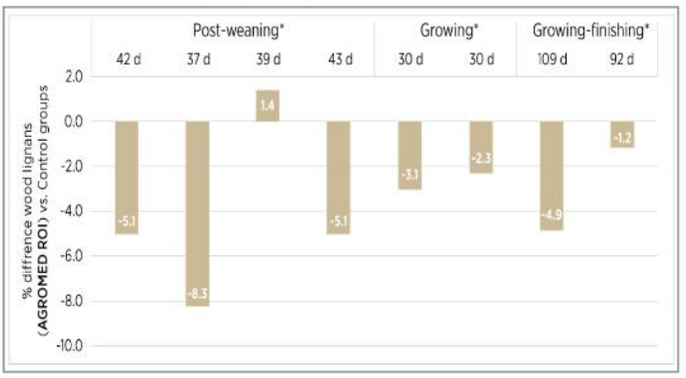


Figure 4 - FCR in commercial pigs as influenced by wood lignan supplementation compared to control groups (average: -3.6%). *The figure indicates the duration of the trial.

By combining all steps in the "chain" wood lignans contribute to all interventions to continue utilising full capacities.

Conclusion: a new era in animal nutrition

Maximising performance is no longer just about nutrition - it's about protecting health, optimising gut function, and minimising invisible threats. In swine production, long-term performance depends on how well the gut, the engine, is maintained. Stressors that the animals face every day act like friction points in the system and just like a factory, the intestinal system needs to run smoothly, with each process working in sync to convert feed into performance of both reproduction and growth.

At A&P Nutrition we recommend a coordinated system approach, addressing each "production stage" as it is essential in achieving longevity in sows, as well as best carcass as well as best carcass parameters in finishing pigs. In the end, sustainable animal performance depends less on pushing limits and more on maintaining this internal machinery. A stable, resilient gut is not just a part of production, it is the production engine itself.

By addressing external factors before they become challenges and providing advanced solutions to resolve the threats quickly and efficiently, A&P Nutrition benefits animal farming businesses by increasing their productivity while maintaining cost efficiency.

References are available on request.

Dietary fibre, though its importance is still often overlooked, is essential for microbiome management. However, the profile of the diet's fibre fraction needs to be carefully selected to supply the ideal combination of inert, soluble and slowly fermentable dietary fibre. This will supply the fibre-fermenting bacteria with the ideal substrate to produce short-chain fatty acids (SCFAs), such as butyrate, the key energy source for enterocytes to uphold a stable intestinal barrier and modulate immune responses.

Eubiotic lignocellulose derived from stem wood and bark combines the mechanical benefits of inert fibre with the advantages of slowly fermentable components to optimise the sow's gut environment. Unlike standard lignocellulose, eubiotic lignocellulose directly supports beneficial bacteria in the large intestine.

As a result, Opticell has been shown to increase total SCFA production in the hindgut of sows by 15% while the production of butyric acid, which is central to metabolic balance, gut integrity and wellbeing, was increased by 29% relative to the control. Consequently, the gestating sows are calmer, show more resting and less stereotypical behaviour, and a higher feed intake in lactation. Thanks to an improved energy allocation, the farrowing duration is, on average, reduced by 16.4% or 41 minutes (all data available on request).

That these benefits are passed on to the piglets is obvious from the start, with 5.6% more live-born piglets whose average birth weight is increased by 2.4%, leading to 3.2% higher weaning weights (Figure 2). Healthy sows build the next production phase on a balanced intestinal foundation.

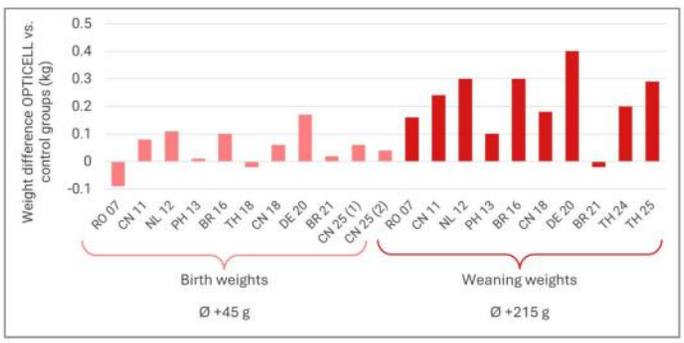


Figure 2 - Overview on birth weight and weaning weight improvements in piglets of sows supplemented with eubiotic lignocellulose (agromed field and scientific trial data, 2007-2025).Figure 2 - Overview on birth weight and weaning weight improvements in piglets of sows supplemented with eubiotic lignocellulose (agromed field and scientific trial data, 2007-2025).

Target acquired: porcine pathogens

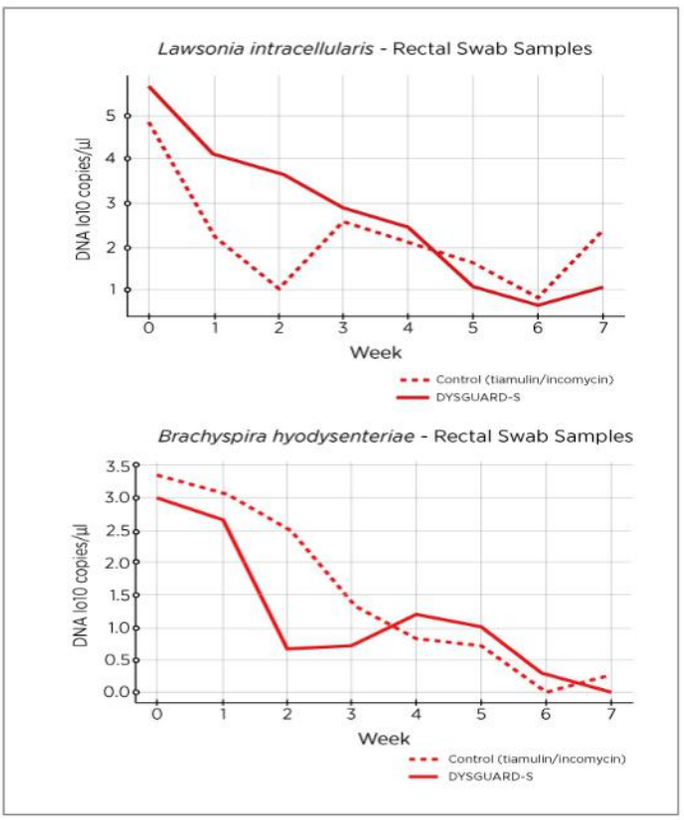
During the pigs' transition into the grower phase, when metabolic intensity and feed intake are high, the digestive system faces its highest microbial challenge. Even with optimised nutrition, swine herds face environmental pathogen challenges.

Lawsonia intracellularis and Brachyspira hyodysenteriae can disrupt the epithelial renewal, provoke local inflammation and destabilise the microbiome. These infections rarely act alone; in field conditions, co-infections are increasingly common, amplifying the severity of intestinal lesions and diarrhea. After taking overhand in the gut community, these infections reduce growth uniformity and feed efficiency, creating variability that impacts production economics.

Conventional management has long relied on pleuromutilin-class antibiotics such as tiamulin and lincomycin, but the emergence of reduced susceptibility of bacterial strains and the global pressure to minimise the use of antibiotic demand viable nutritional alternatives.

A standardised blend of phytogenic substances can provide acute support under these challenging conditions but may also act as preventive measure to boost resilience. Its bioactive components modulate the immune system and negative impacts of pathogens on the microbial balance and gut barrier integrity.

A recent field study demonstrated that a blend of essential oils offered efficacy comparable to tiamulin/lincomycin against a combined infection of Lawsonia and Brachyspira. Over 7 weeks, pigs receiving essential oils showed a continuous reduction of L. intracellularis and B. hyodysenteriae, matching antibiotic-treated controls without withdrawal limitations (Figure 3). Histological assessment confirmed preserved villus-crypt architecture and reduced mucosal inflammation in the test group, reflecting the additive's protective actions.



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- **Breeder:** Balanced calcium/phosphorus, vitamins for reproduction & sow longevity
- **Grower & Finisher:** Optimized energy:protein ratio for lean muscle growth, less fat deposition.

2. HIGH DIGESTIBILITY & GUT HEALTH SUPPORT

- **Functional fibers*:** Prebiotics, β-glucans, resistant starch improve microbiome & immunity

3. PROPER ENERGY DENSITY

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