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SORGHUM IN PORK FEEDING – THE MAIN PLUS AND CONTRA

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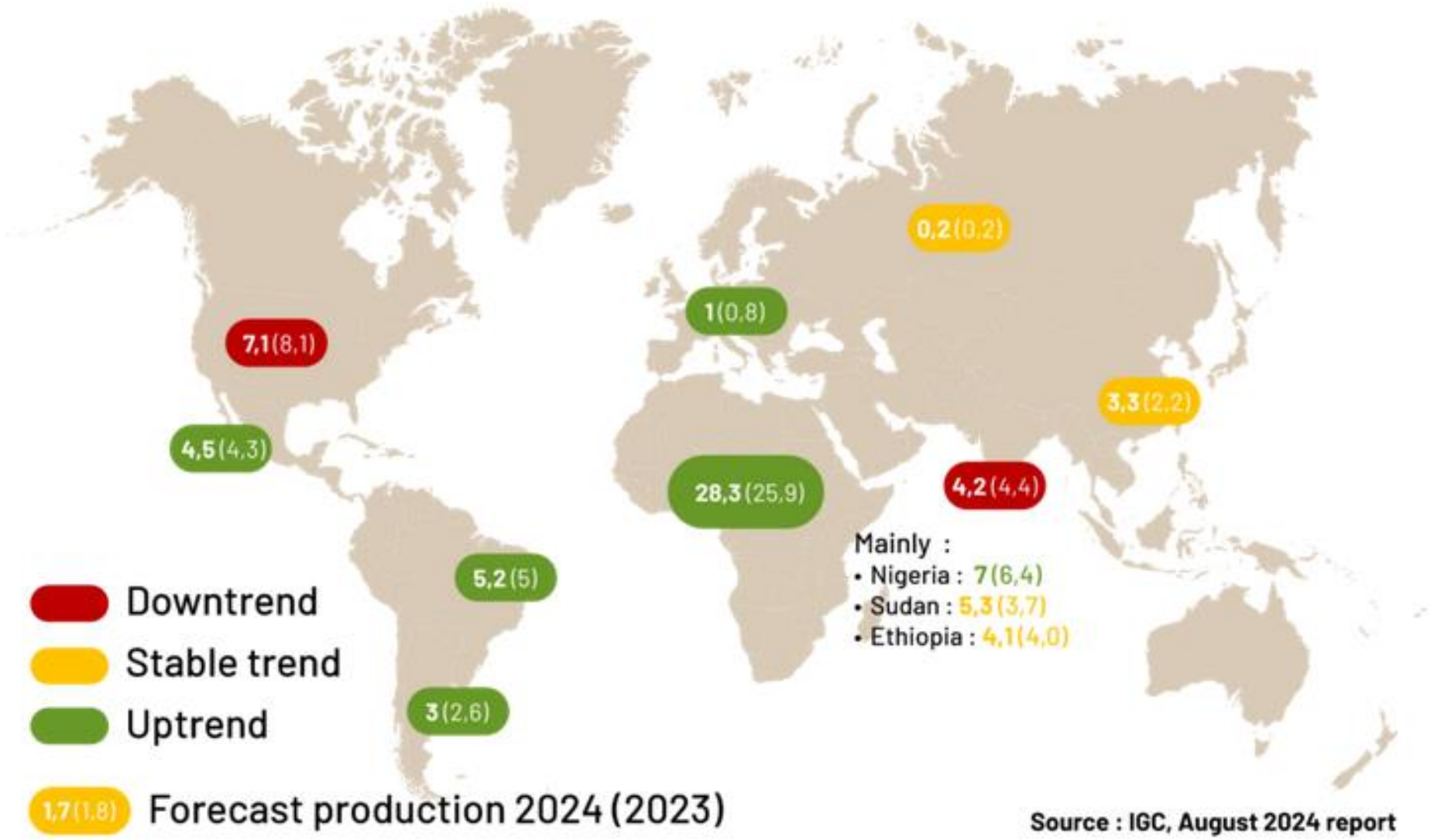
Sorghum – the plant of the future?

- Progressive climate change;
- High yield potential;
- Resistance to climatic stress;
- Wide range of applications.

Source: own work.
Source photo: https://kansasfarmfoodconnection.org/spotlights/fun-facts-about-sorghum

World production of sorghum



Sustainable

- Adaptability to poor soils and climate;
- Drought-resistant cereal grain;
- Typically cultivated in semi-arid conditions;
- Lower demand for fertilizers and plant products.

Soruce: Schwarz and Ovissipour, 2022. DOI/10.3390/agriculture12050669.
Source photo: https://www.euroschoolindia.com/blogs/sustainable-development-meaning-types/

Advantages of sorghum

- Non-genetically modified plant;
- Gluten-free;
- Ancient grain;
- Feed for livestock;
- Food grain for the inhabitants of Asia and Africa.

Source: Own work
Source photo: https://www.feedipedia.org/node/224

Proximate composition of sorghum, corn, and wheat (as–fed basis) (NRC, 2012)

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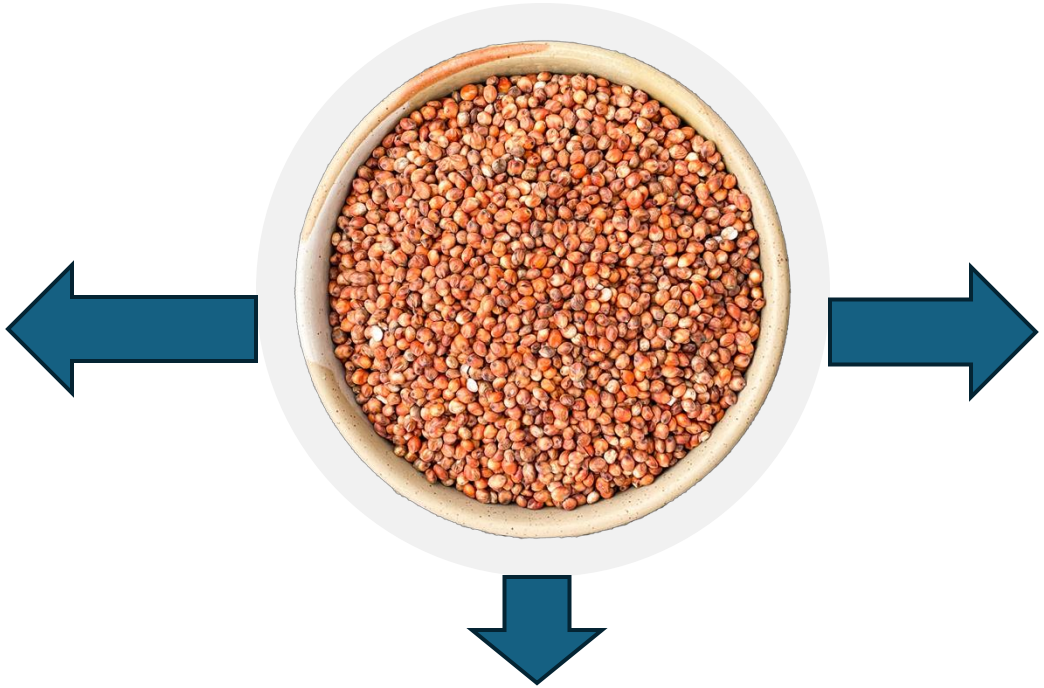
Items	Sorghum	Corn	Wheat
Dry matter, %	89.4	89.3	86.4-88.7
Crude protein, %	9.4	8.2	10.9-14.5
Ether extract, %	3.4	3.5	1.4-1.8
Crude fibre, %	2.1	2.0	2.6
Ash, %	1.6	1.3	2.0
Essential amino acids, %			
Arginine	0.36	0.37	0.52-0.60
Histidine	0.21	0.24	0.28-0.34
Isoleucine	0.36	0.28	0.34-0.47
Leucine	1.21	0.96	0.68-0.91
Lysine	0.20	0.25	0.35-0.39
Methionine	0.16	0.18	0.22
Phenylalanine	0.48	0.39	0.52-0.64
Threonine	0.30	0.28	0.35-0.40
Tryptophan	0.07	0.06	0.14-0.17
Valine	0.46	0.38	0.47-0.58

Sorghum anti-nutritional factors

Tannins

- Reduce protein, strach, and mineral digestibility;
- Reduce palability;
- Cause dysfunction of cellular membranes.



Enzyme inhibitors

- Inhibit digestive enzymes (amylase, lypase, trypsin);
- Reduce protein digestibillity and absorption of amino acids.

Phytates

- Decrease digestive enzyme activity e.g. α-amylase, glucoamylase, and lipase;
- Chelate mineral reducing their absorption;
- Reduce protein and carbohydrate digestibillity.

Source: Rodríguez-Espana et al., 2022. DOI: 10.1016/j.crfs.2022.04.014; Source photo: https://mountzeroolives.com.au/products/red-sorghum-1-5kg

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Treating sorghum by some treatments

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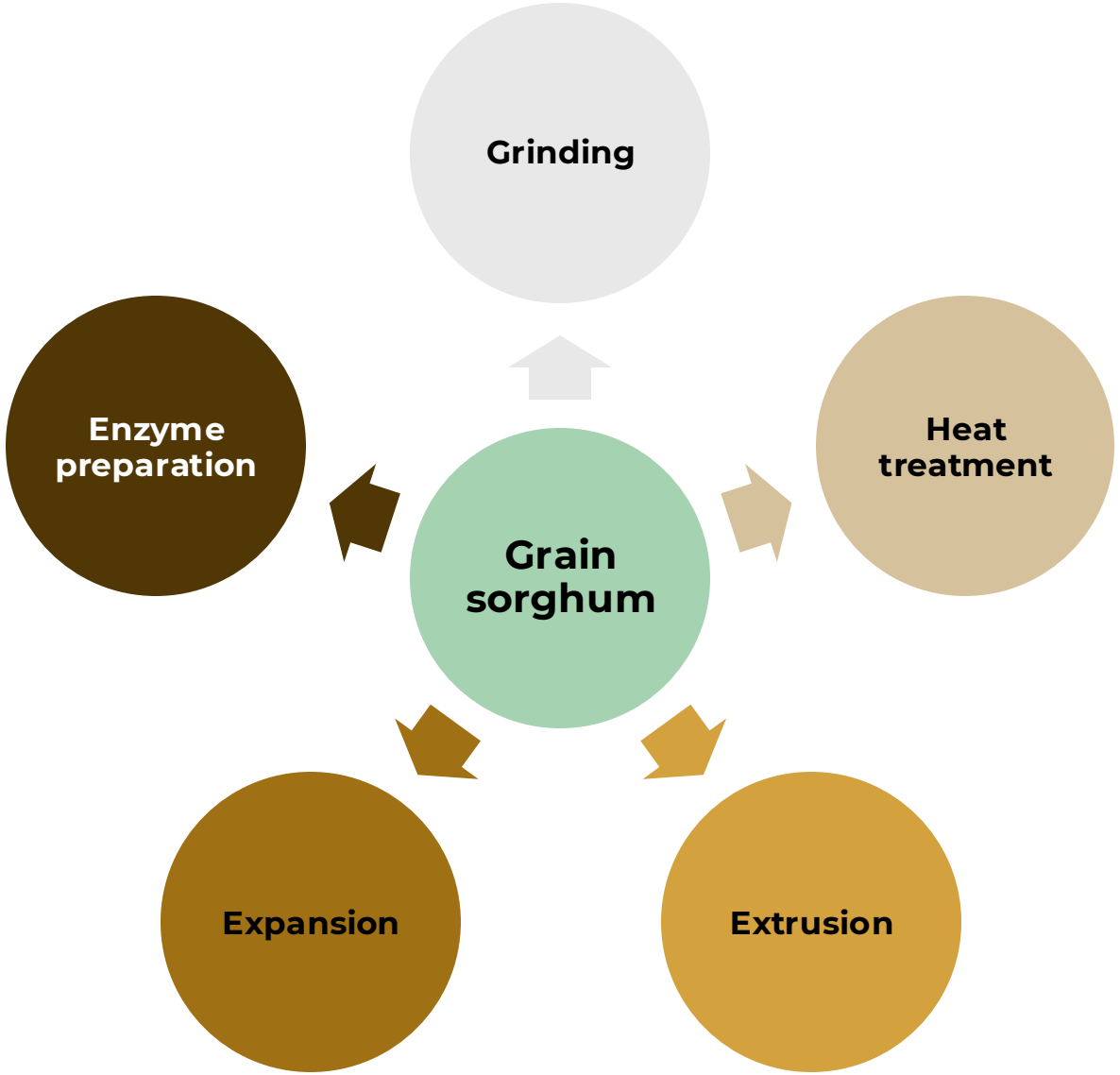

Soruce: Zhang et al., 2025. DOI:10.3390/ani15030328

Application of sorghum to swine diets

- Fully or partially replacing corn with sorghum can be used without compromising the growth performance of pigs.
- Various factors may affect growth performance such as the growth stage of the pigs, the varieties of sorghum, the growing environment of the sorghum, and differences in the anti-nutritional factors contents.

Soruce: Zhang et al., 2025. DOI:10.3390/ani15030328

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Recommendations for feedding grain sorghum

- Grain sorghum can replace all corn, wheat or barley in diets fed to all classes of swine.
- Because of its nutrient profile, including greater amounts of digestible threonine, tryptophan, valine and digestible phosphorus, it affords different opportunities for diet formulation.

Source: Feed value benefits of sorghum for swine.
Source photo: https://www.synbiobeta.com/read/cultured-meat-porks-out-on-sorghum-proteins

Effects of feeding sorghum on swine performance – Moreira et al. 2014

- Partial substitution of corn by sorghum in diet of castrated pigs and the effects on performance, carcass traits and economic feasibility.
- 27 crossbred barrows from commercial line with 19.66 ± 2,92kg of initial live weight.
- Divided in three groups with increasing rates of sorghum-0%, 25% and 50%-replacing corn.

The trial evaluated:

- daily weight gain, daily feed intake and feed:gain ratio, backfat thickness;
- blood biochemical parameters-urea, total proteins, creatinine, glucose, triglycerides and cholesterol;
- hot and cold carcass weight, hot and cold carcass yield, pH and temperature in hot and cold carcasses and industrial weight cuts;
- for economy feasibility was calculated the cost of feed consumed, cost of pig kg, average cost index and economy efficiency rate.

Result and conclusion

- No effects were found for performance data and carcass traits.
- The bioeconomical performance showed that 50% sorghum had the lowest cost and the highest rate of economic efficiency.
- Thus, it was concluded that substitution of corn by sorghum at levels up to 50% of the diet represents an alternative to sustainability of regional swine production.

Effects of feeding sorghum on the intestinal health of pigs

- The inclusion of sorghum in the diets of weaned pigs may alleviate diarrhea and oxidative stress, significantly lowering the MDA (malondialdehyde) content in the serum and jejunum. (Pan et al., 2017; Chen et al., 2017)
- Additionally, it reduces the villus height and crypt depth in the jejunum, while increasing the population of beneficial bacteria, such as *Bifidobacterium* and *Lactobacillus*, in the intestine. (Chen et al., 2017; Hughes et al., 2007)
- The findings suggest that the use of sorghum to fully replace corn in diets could benefit pigs with increased growth and feed intake, potentially by reducing oxidative stress (Chen et al., 2017).

Source: Zhang et al., 2025. DOI: /10.3390/ ani15030328

Effect of feeding sorghum on pork quality

- Pigs fed a diet with sorghum had a more balanced proportion of fatty acids in their back fat and improved meat quality than pigs fed corn basal diets. (Benz et al., 2011)
- Zhanget al. (2019) found that replacing corn with sorghum at levels of 30%, 65%, and 100% resulted in increases in back fat thickness of 3.0%, 5.2%, and 4.3% ,respectively. The contents of oleicacid, trans-oleicacid, arachidic acid, and arachidonicacid in the *Longissimus dorsi* increased.

A summary of sorghum pros and cons for pig feed development

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Pros

- Large global production
- Sustainable
- Non-GMO
- Emerging nutrient source
- Good results in omnivorous and herbivores
- High antioxidant level

Cons

- Low protein content
- Lower protein and starch digestibility
- Deficiency in lysine and threonine
- Anti-nutritional factors

Source: Zarei et al., 2022. DOI:10.3390/agriculture12050669

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Conclusion

- There is a prospect of increasing the area of sorghum cultivation in Europe and worldwide.
- Advantage of this cereal is the multi-purpose use of its grains.
- The possibility of using sorghum grains for fodder purposes may diversify the fodder grain base.
- Sorghum is used as one of the energy feedstocks to replace corn in pig diets, because it contains nutrients similar to corn, such as crude protein, energy, some amino acids, etc.