BLUE ECONOMY AQUACULTURE FORUM

BSF and alternative proteins
NOT JUST PROTEINS!

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Antibiotics

Antibiotic Treatments – Future Regulations of Use in EU?

- Single-Animal Treatment, INJECTABLES, Strongly “Encouraged”, but that at least will have to stay, for animal welfare reasons
- Antibiotic Treatment Allowed Only for (Very) Young Animals

South-East Asia – Set An Example for The Emerging World?

- So far farmers rely too much on antibiotics as health management tool
- Often ignoring already existing legislation

Antibiotic Misuse & Overuse – Not Just A Resistance Issue…

- … but an economic one as it is a sign of lacking husbandry skills
- This leads to low productivity on an international level…
- Which in turn threaten the chances of survival in the long run

Risk factors : how to reduce the risk!

- **PEOPLE: FARMERS – WORKERS – VETS !!!!!**

- **BIOSAFETY** — **EDUCATION + IMAGE**

- **DISEASES**: Pathogens — **STABILISATION OF THE IMMUNE SYSTEM: VACCINATION,…..**

- **FEED**: - Quality
  - raw materials
  - composition

  GUT HEALTH - MICROBIOM

  - Quantity
    - feeding strategy
    - feeding technologY
    - water supply

Solving health challenges

- IMPROVE THE EDUCATION LEVEL OF OUR STOCKMEN
- IMPROVE THE IMAGE – SOCIAL ACCEPTANCE OF OUR FARMERS
- STABILIZE THE HEALTH STATUS BY VACCINATION / IMMUNOMODULATION
- STRATEGIES TO STABILZE GUT HEALTH

Stabilizing GUT HEALTH?

INSECT PRODUCTS COMPRISE VARIOUS ANTIMICROBIAL COMPONENTS !

- LAURIC ACID
- LYSOZYMES
- CHITIN
- ANTIMICROBIAL PEPTIDES

„proof of concept studies“ – SAN Group

Severe practical challenges in our vet clinic

livestock :

piglets after weaning: diarrhea and strep suis meningitis
cannibalism

pets:

dog breeding: dietary diarrhea
multi-causal allergies of skin and mucous membranes

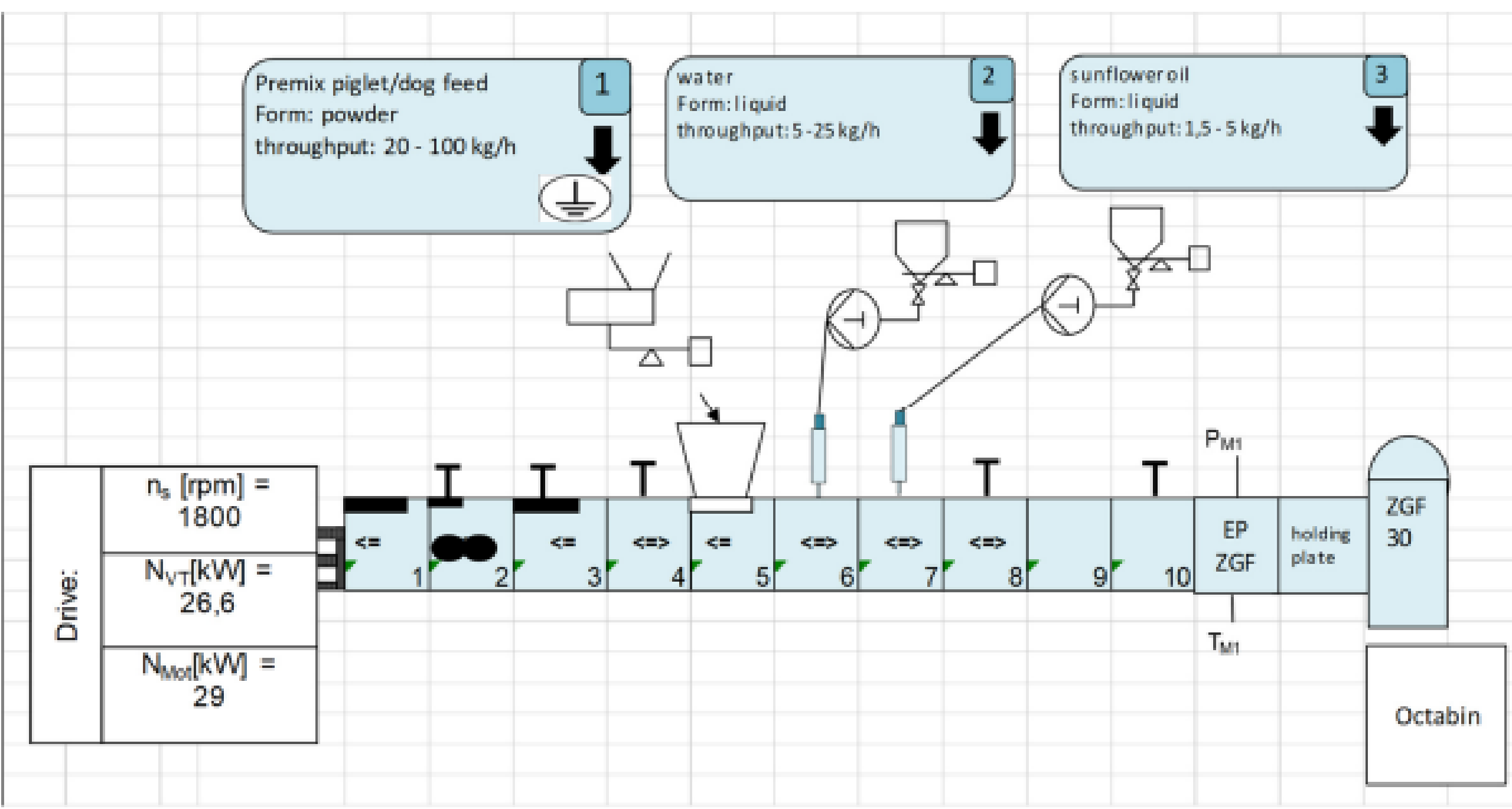


Figure 6: Schematic illustration of the test setup. Sunflower oil (dosage #3) was only added in the dog feed.

Small batch production with COPERION EXTRUDERS

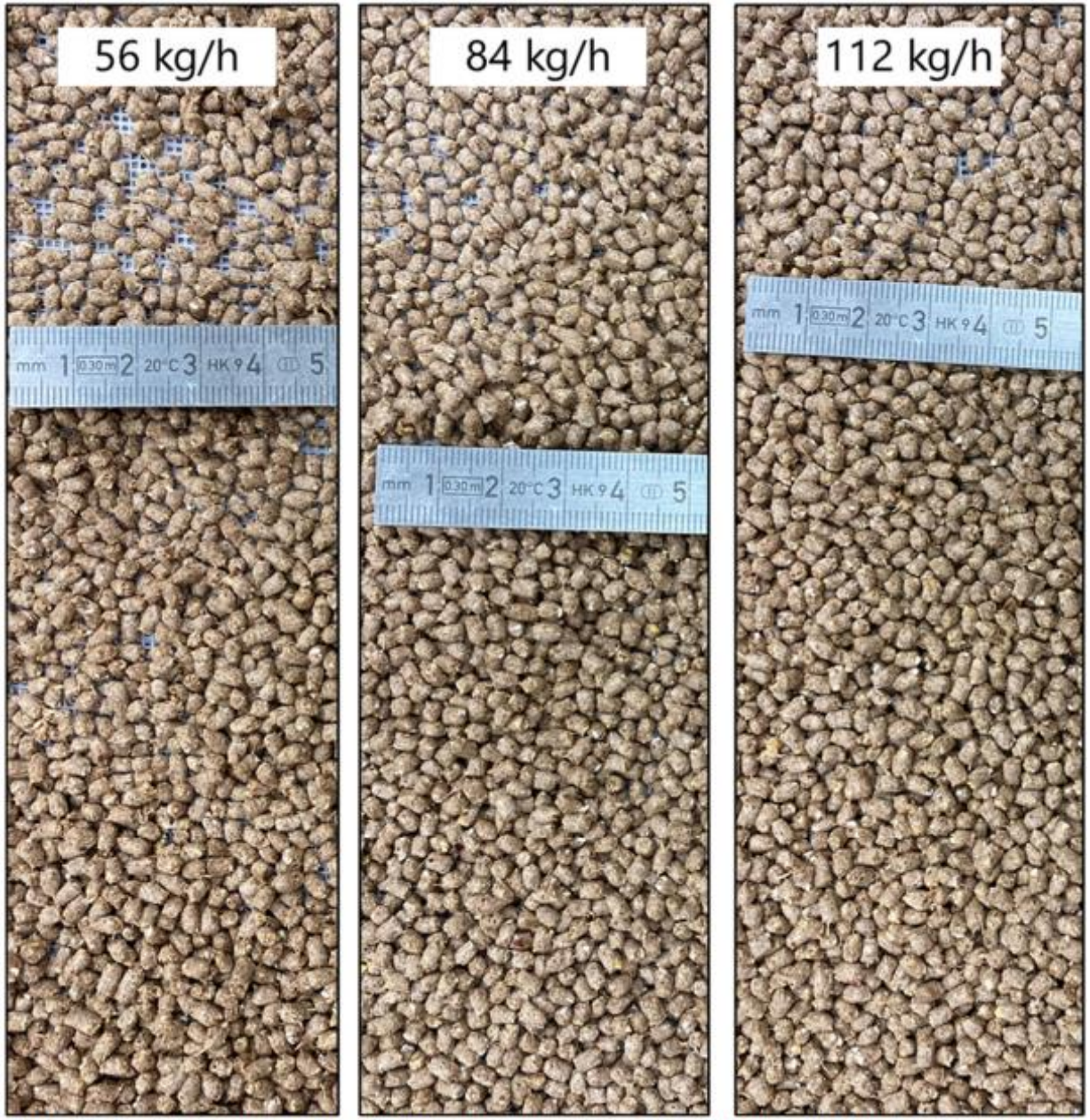


Figure 10: Product structure at three different overall throughputs: 56 kg/h (setting 6), 84 kg/h (setting 9) and 112

Figure 13: Comparison of product samples without (setting 20, left) and with oil (setting 21, right).

Results of our studies

LIVESTOCK:

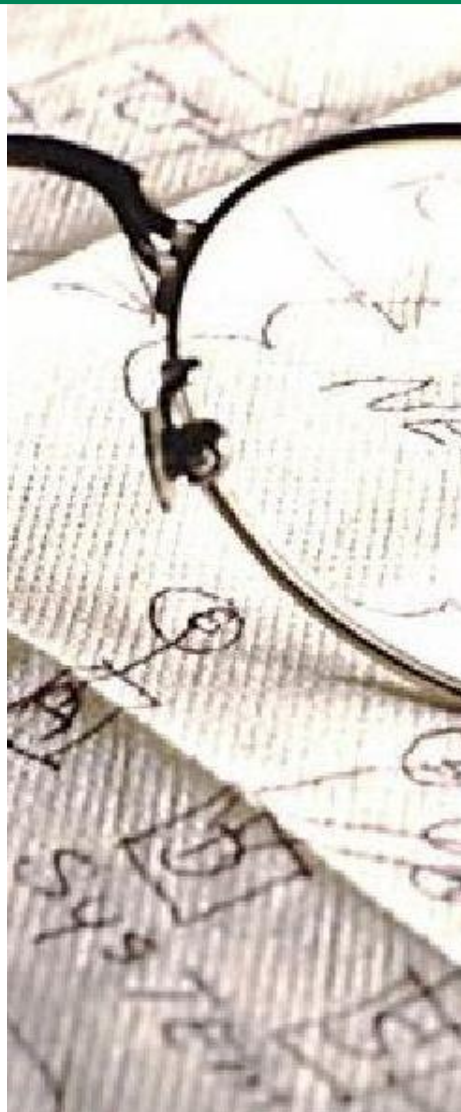
Reduction of SBM in the weaning diet to 5% !!

- no weaning diarrhea and
- no Strep. Suis meningitis without use of antimicrobials
- no cannibalism ?

PETS – DOG BREEDING AND „DOG CLIENTS“

Reduction of meat in the diet to zero!!!

- excellent acceptance
- no diarrhea
- nearly all allergies „dissappeared“!



Next challenge: think about fish feed – sustainabiliity of aquaculture !!

Fishmeal in aquaculture

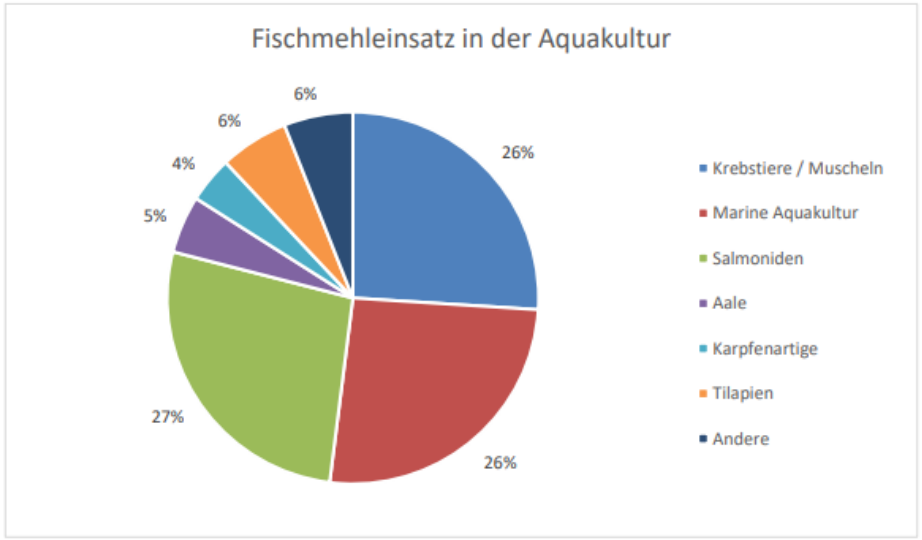


Abbildung 12: Fischmehleinsatz in der Aquakultur (ECOFLY, 2018)

Environmental impact: insect meal – fishmeal

consumption of resources gobal warming potential toxicity

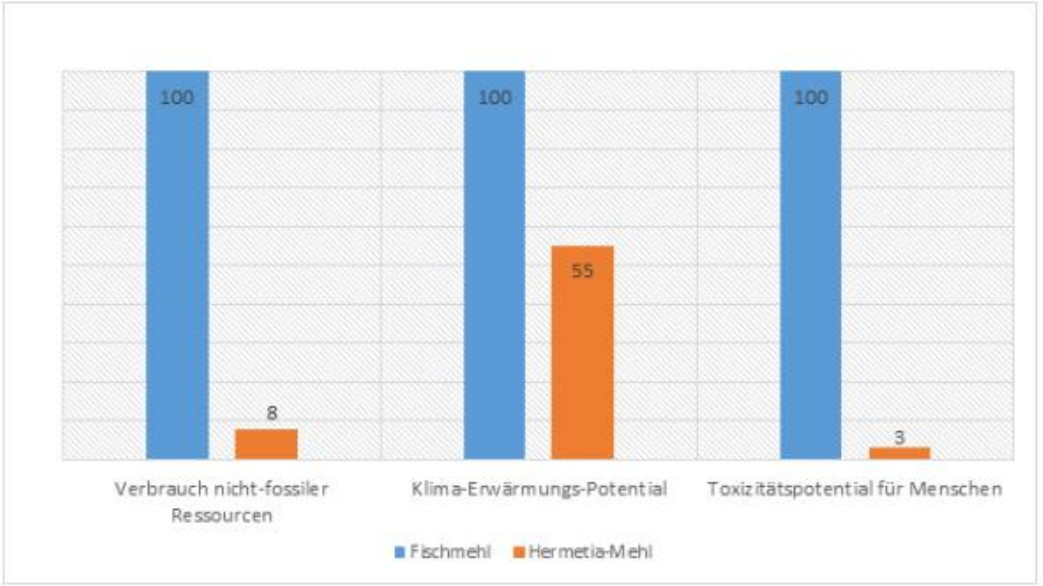


Abbildung 11: Vergleich einiger Kennzahlen zum Umwelteinfluss der Produktion von von Fischmehl und Hermetia-Mehl (Smarason et al. 2017)

animals

Article

Fishmeal Dietary Replacement Up to 50%: A Comparative Study of Two Insect Meals for Rainbow Trout (Oncorhynchus mykiss)

Federico Melenchón, Eduardo de Mercado , Héctor J. Pula , Gabriel Cardenete , Fernando G. Barroso , Dmitri Fabrikov , Helena M. Lourenço , María-Fernanda Pessoa , Leidy Lagos , Pabodha Weththasinghe , Marcos Cortés and Cristina Tomás-Almenar

This study shows the importance of adequately selecting a type of IM before its inclusion as an ingredient in aquafeeds. Although in terms of absolute values for growth performance, the use of HI or TM (black soldier fly, Hermetia illucens, and yellow mealworm, Tenebrio molitor) in feeds for rainbow trout was efficient!

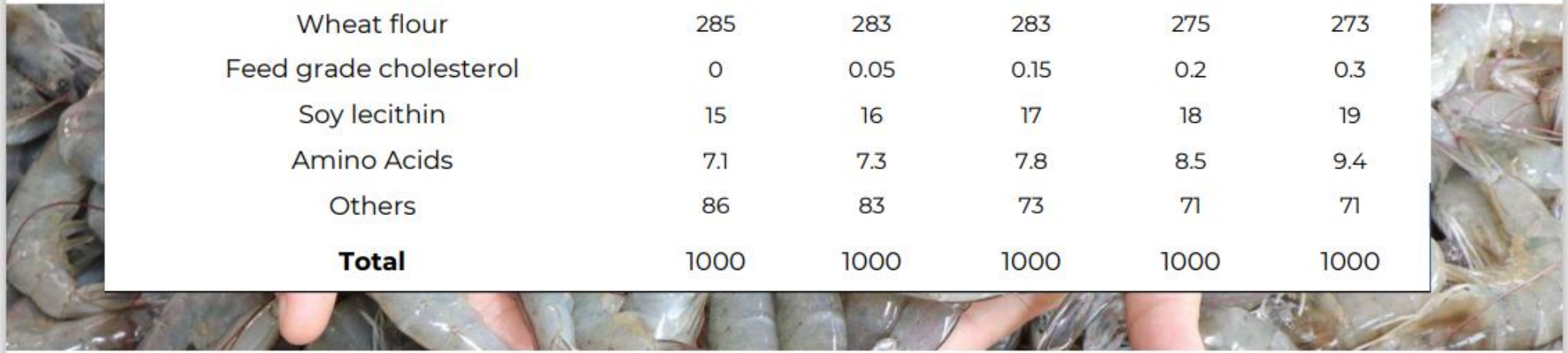
Proximate Composition	*Hermetia ilucens* (HI)	*Tenebrio molitor* (TM)
Crude protein (%)	28.5	39.1
Crude fat (%)	25.6	27.0
Crude ash (%)	9.75	3.42
Moisture (%)	8.00	5.00
Calcium (g/Kg)	35.2	0.93
Phosphorus (g/Kg)	7.00	7.50
Calcium–phosphorus ratio	5.03	0.12
Chitin (%)	7.50	5.90
Amino acid composition (g/100 g IM)		
Asp (aspartate)	2.92	3.71
Thr (threonine)	0.95	1.44
Ser (serine)	1.43	2.49
Glu (glutamate)	3.19	4.98
Pro (proline)	1.58	3.04
Gly (glycine)	1.84	2.87
Ala (alanine)	2.37	3.92
Cys (cysteine)	0.13	0.24
Val (valine)	1.42	2.32
Met (methionine)	0.47	0.57
Ile (isoleucine)	0.91	1.31
Leu (leucine)	1.86	2.96
Tyr (tyrosine)	2.23	4.47
Phe (phenylalanine)	2.16	3.07
His (histidine)	1.07	1.77
Lys (lysine)	1.94	2.49
Arg (arginine)	1.24	1.81

Proximate and amino acids compositions of insect meals (IMs).

Feed formulas (kg/MT)

Nutrition Technologies® Innovation. Naturally. SHRIMPVET

Ingredients	Control Basal Diet	5% FM Replacement	15% FM Replacement	25% FM Replacement	35% FM Replacement
Premium fish meal (anchovy) 67% CP	265.00	251.80	225.25	198.75	172.25
Soybean meal, 45% CP	322.00	328.00	338.00	349.00	350.00
Hi.Protein® 50% CP	0.00	13.20	39.75	66.25	92.75
Tuna oil	20	17.9	16	13	12
Wheat flour	285	283	283	275	273
Feed grade cholesterol	0	0.05	0.15	0.2	0.3
Soy lecithin	15	16	17	18	19
Amino Acids	7.1	7.3	7.8	8.5	9.4
Others	86	83	73	71	71
Total	1000	1000	1000	1000	1000



Nutrients (as Fed)	2020 batch	2021 batch	Difference
CP (%)	50.2	51.4	2%
Chitin correct CP (%)	45.36	46.26	2%
CF (%)	10.3	10.04	-3%
Moisture (%)	4.8	5.02	4%
Ash (%)	9.24	7.88	-17%
Fat (%)	14.5	18.5	22%

Amino acids (%)	% as Fed	% as Fed	Difference
Lysine	1.85	2.88	36%
Methionine	0.42	1.44	71%
Threonine	1.27	1.71	26%
Leucine	2.36	3.45	32%
Tryptophan	0.45	0.37	-22%
Valine	2.00	2.27	12%
Arginine	1.64	2.85	42%
Tyrosine	2.09	2.68	22%

Fatty acid profile – insect meal from Hermetia Illucens - OK – but not perfect !!!

Fettsäurenprofil des Insektenmehls (bestehend aus Hermetia Illucens)

Die Werte unterliegen natürlichen Schwankungen.

Fettsäure	**%**	**Fettsäure**	**%**
Gesättigte Fettsäuren	66,4	Caprinsäure	0,8
Einfach ungesättigte Fettsäuren	14,1	Laurinsäure	37,0
Mehrfach ungesättigten Fettsäuren	18,4	Myristinsäure	8,5
Omega-3-Fettsäuren	1,3	Myristoleinsäure	0,2
Omega-6-Fettsäuren	17,0	Palmitinsäure	16,9
Omega-9-Fettsäuren	11,2	Palmitoleinsäure	2,6
Trans-Fettsäure	> 0,1	Heptadecansäure	0,1
Stearinsäure	2,7		

Insect meal from Hermetia Illucens versus HP-SBM - OK – but not enough !!!

	SES	Hermetia Mehl
Inhaltsstoff		
Trockenmasse	895	945
Rohprotein	481	608
Rohasche	69	75
Rohfett	21	141
Rohfaser	93	109
Aminosäuren-Gehalt		
Lysin	6,07	5,42
Methionin	1,28	1,24
Cystein	1,46	0,80
Threonin	3,78	3,57
Arginin	7,19	4,12
Valin	4,37	5,36
Leucin	7,32	6,24
Isoleucin	4,34	3,86
Histidin	2,53	2,73

HBLFA
Raumberg-Gumpenstein
Landwirtschaft

Chemical and nutritional properties of channel and hybrid catfish byproducts

Peter J. Bechtel, [1] John M. Bland, [1] Karen L. Bett-Garber, [1] Casey C. Grimm, [1] Suzanne S. Brashear, [1] Steven W. Lloyd, [1] Michael A. Watson, [1] and Jeanne M. Lea [1]

Processing of catfish results in the production of a large amount of fish waste. In 2014, 136,975 metric tons of catfish was processed in the US (Hanson, 2015). Depending on what product is being produced, the waste (or byproduct) can account for greater than 60% (82,000 metric tons in 2015) of the harvested weight of the fish. Fish processing byproducts consist primarily of heads, viscera, frames, skin, and lesser amounts of blood and fins (Crapo & Bechtel, 2003). Currently catfish byproduct from commercial processing operations is combined and sold to rendering plants where the byproduct is made into protein meals and oils used primarily as feed ingredients. However, some smaller operations may choose to dispose off the waste, make fertilizers, or use it directly as a feed ingredient.

The percent lipid found in all the byproducts was high when compared to the lipid levels found in ocean-harvested marine byproducts. Catfish byproducts are a good source of fish oil and protein, which make these products good candidates for the production of food and feed oil and protein ingredients.

SLAUGHTER WASTE FROM CATFISH PRODUCTION – a trial report !!

Coperion- results of the fish slurry dosing test:

After the trials, it was discussed if a ZSK 43 could be operated to produce fish feed. This fish feed should be produced from 10 – 30 % of fish slurry, which contains slaughter waste from fish processing.

A larger 22 batch of this fish slurry was sent to Coperion after the trial, to allow an evaluation of the material and perform a dosing test.

The fish slurry had a density of 1011,5 kg/m^3. The water content was determined with a gravimetrical method to be 70,4 %.

The material had a protein content of 55 % and a fat content of 15 % in the dry matter, which resembles to a protein content of 16,5 % and a fat content of 4,5 % in the wet state.

It should be mentioned, that the fish slurry was produced with the addition of ice during blending (and water content therefore increased);

According to Mr. Entenfellner, this additional ice must not be used in the future, as heat generation in the material during blending was lower than expected. Dosing of the material was tested with a peristaltic and an excentric screw pump.

SLAUGHTER WASTE FROM CATFISH PRODUCTION – a trial report !!

Industrial handling of slaughter waste:

Excentric screw pump used for the dosing test. Dosing with the peristaltic pump was not possible, the pump was not able to generate enough suction pressure to get the material into the tube. However, dosing with the eccentric screw pump was possible. The storage tank on top is equipped with a stuffing screw, which pushes the material into the eccentric screw. The material is then conveyed through the screw and finally pushed out at the bottom of the machine (see Figure 18).

Current activity: setting up a BSF production system

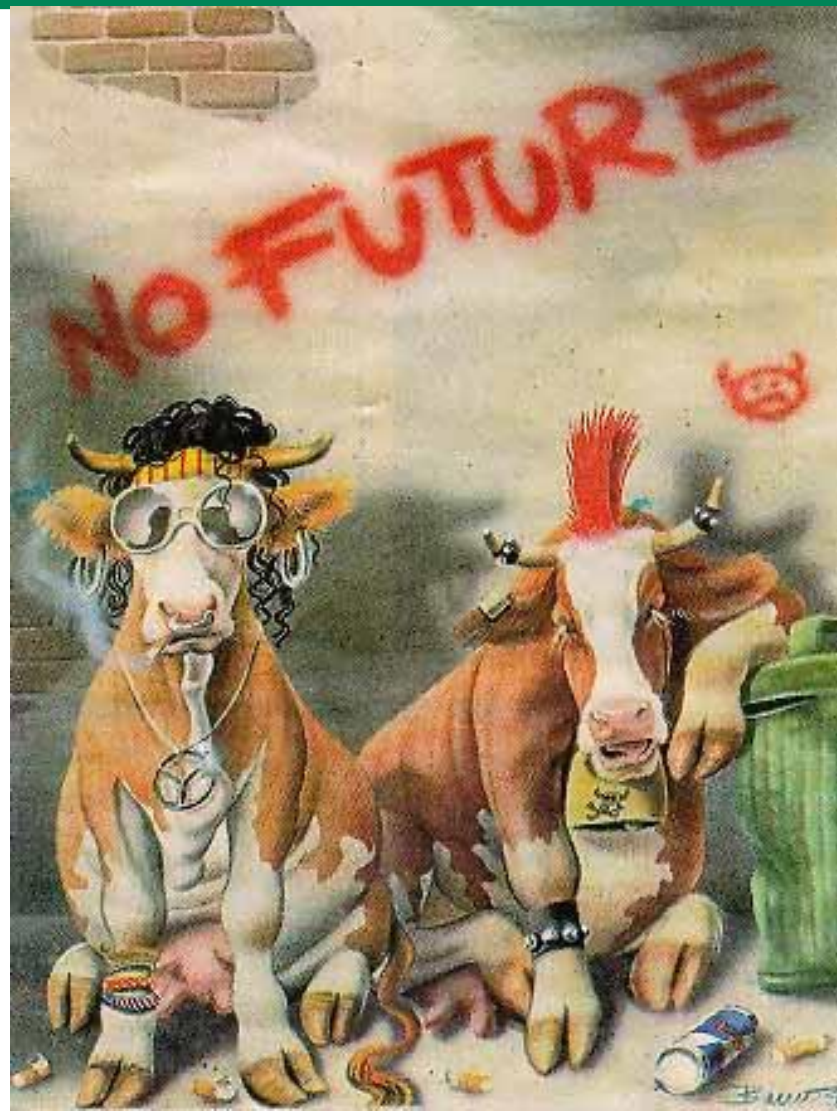
- Substrate: agro-industrial feed-residues
- BSF: effective and robust, easy to handle
- five hundred times body mass in 14 days!!!!!!!
- to stabilize availability and quality of „our concept“
- APP – Alternative Protein Production: coop. with SAN- Group

BLUE ECONOMY AQUACULTURE FORUM

2024

Our new employees – competence for sustainable aquaculture !!!!

Thank You very much for the invitation – GOOD LUCK



APP Production GmbH