

To the Managing Director of

Bioaktiv GmbH

Test report

to determine the efficiency of the product

BioAktiv for liquid manure

The experiment to determine the efficiency of the product BioAktiv for liquid manure was carried out between June and October 2010.

The product was applied in keeping with the manufacturer's instructions.

Four piggeries were selected for the trial (2 controls no. 4/1; 4/3 and 2 experimental houses no. 4/4 and 5/3).



Results:

1. Product efficiency in reducing noxious gas emissions in pig houses

During the experiment, noxious gases in test and control facilities were measured five times. Readings are shown below.

Table 1 Analysis of air in production houses

Measuring date	Parameter	Pig house 4/1 (Control)	Pig house 4/4 (BioAktiv)	Pig house 4/3 (Control)	Pig house 5/3 (BioAktiv)
July 29, 2010	Oxygen in %	21	21	21	21
	Carbon monoxide	0	0	0	0
	Nitrogen monoxide	0.1	0.1	0.1	0.1
	Sulfur monoxide	0.1	0	0	0
	Ammonia	4.7	0.4	3.1	2.1
Aug. 3, 2010	Oxygen in %	21	21	21	21
	Carbon monoxide	0.1	0	0	0
	Nitrogen monoxide	0.2	0.1	0.2	0.1
	Sulfur monoxide	0.1	0	0	0.1
	Ammonia	4.4	2.5	4.2	2.2
Aug. 19, 2010	Oxygen in %	21	21	21	21
	Carbon monoxide	0	0	0	0
	Nitrogen monoxide	0.1	0.1	0.1	0.1
	Sulfur monoxide	0	0.1	0	0.1
	Ammonia	3.6	1.9	2.1	2.4
Aug. 31, 2010	Oxygen in %	21	21	21	21
	Carbon monoxide	0	0	0	0
	Nitrogen monoxide	0	0	0.1	0
	Sulfur monoxide	0.1	0.1	0	0
	Ammonia	4.6	3.8	2.7	3
Sept. 14, 2010	Oxygen in %	21		21	21
	Carbon monoxide	0		0	0
	Nitrogen monoxide	0		0	0
	Sulfur monoxide	0.1		0.7	0
	Ammonia	5.3		3.6	2.9

Summary: Readings show the concentration of noxious gases (ammonia) in experimental piggeries using BioAktiv to be 1.3 - 2 times less than in control houses.

The weather was extremely hot throughout the experiment, with ventilation in pig houses running at 100% capacity.

2. Testing the efficiency of BioAktiv for making longer use of liquid manure basins having no outlets and reducing water consumption in pig housing

During the experiment, process water consumption was calculated and the max. period determined for using liquid manure basins. It turned out that **total water consumption in the control groups was 4,139 m³ but only 1,363 m³ in the test houses using BioAktiv.** Liquid manure basins in the test houses could be used about three times longer, with average availability for use rising from 14 to 43 days.

Summary: BioAktiv for liquid manure lengthens the use cycle of liquid manure basins without affecting the microclimate. Water consumption drops to almost one third.

3. Incidence of diseases

Diseases which occurred during the experiment are shown in Table 2 below.

Table 2 – Diseases analyzed

Nr. p/p	Type of disease	Per head			
		Pig house 4/1	Pig house 4/4	Pig house 4/3	Pig house 5/3
		(Control)	(BioAktiv)	(Control)	(BioAktiv)
1	Bronchopneumonia	48	40	117	93
2	Gastroenteritis	36	42	27	34
3	Wasting syndrome	10	13	98	18
4	Dermatitis (scratches)	178	0	28	105
5	Tail injuries (cannibalism)	97	123	135	76
6	Total	369	218	405	326

Summary: In the test houses, the number of sick animals was 230 less (-27%), including tail injuries (cannibalism) of which there were 33 cases less (-14%).

The "BioAktiv" product has reduced the emission of noxious gases in production pig houses and the overall incidence of animal diseases and cannibalism.

4. Production results

These are shown for the time of the experiment in Table 3.

Table 3 – Production results analyzed

	Pig house 4/1 Control	Pig house 4/4 BioAktiv	Pig house 4/3 Control	Pig house 5/3 BioAktiv
Initial stock (animals)	874	814	917	894
Stalling weight (kg)	33.74	33.85	33.66	35.04
No. of animals fattened	863	806	904	882
Wt. when leaving house (kg)	103.84	103.21	103.53	103.11
Weight gain, g/d	799	863	751	707
Fattening days	88	81	93	96
Animal losses	11	8	13	12

Summary: Fewer animals (4) were lost in the test houses using BioAktiv.

Daily weight gain in test group 5/3 was unbalanced due to extremely hot weather during the experiment (with groups of animals spending different periods of time in adverse ambient conditions). It was highest in test house 4/4 (863 g), which was 64 g more than in control group 4/1 and 112 g more than in control group 4/3.

5. Economic efficiency as affected by BioAktiv for liquid manure

This was calculated with the following factors in mind:

- **Effect on better average daily weight gain** – the 2 pig houses yielded an overall economic effect of Euro 2043,85€ (2840,95\$) due to the fact that daily gain in test house 4/4 (863 g) was higher than in the control houses (by 63/112 g).
- **Effect on animal survival rate** – based on results for the 2 pig houses the overall economic effect here is 678,50€ (943,08\$). Animals enjoyed somewhat better safety/survival rates in the test house than in the control groups so that another 4 pigs survived here.
- **Effect on water consumption** and subsequent use of effluent as fertilizer, calculated with reference to these points: m³ of water saved and the cost of liquid manure disposal on the fields. The economic yield for overall water savings of 2,776 m³ and the cost of emptying the liquid manure basins was a profit of 1605,15€ (2231,16\$).

The total economic effect for the time of the experiment then is
 $2043,85\text{€} + 678,5\text{€} + 1605,15\text{€} = 4327,50\text{€} (6015,22\text{\$})$

Cost of the product used during the experiment:
 $19.2 \text{ kg} * 21,95\text{€} (30,51\text{\$})/\text{kg} = 421,47\text{€} (585,84\text{\$})$

The overall positive economic effect, less material costs, equals:

3906,03€ (5429,38\$)

Cost saving 4327,50€ (6015,22\$)	BioAktiv animals 1,688	Saving/animal 2,57€ (3,58\$)
Cost of BioAktiv 421,47€ (585,84\$)	BioAktiv animals 1,688	Cost/animal 0,25€ (0,34\$)
Cost / benefit ratio 1 : 10		

Note:

The effect of BioAktiv on pig production will be even greater in spring/fall and during the cold season (with less ventilation and higher emissions of noxious gases) so that **emissions of noxious gases are reduced, daily weight gain improves, more animals survive, less power is needed to produce the best possible microclimate, and liquid manure disposal is facilitated.**

Oct. 18, 2010