



Whirlwind® Air Classifier

Air Classification of Rendered Animal Meals

Low Ash, High Protein Products

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BACKGROUND/ CHALLENGE

Rendered animal meals provide a great source of protein for livestock animals but often contain levels of ash that are too high to be used in pet food for domestic animals (dogs & cats). This forces producers to rely on the quality of raw materials to determine when pet food grade meals can be made. When there is a shortage of low ash raw materials, producers simply cannot make high value pet grade products.

The challenge is to convert livestock grade protein meals into pet food grade meals without any waste. In other words, create two products from one.



EXTENDING THE RENDERING PROCESS

Rendered animal protein meals are produced through a series of steps that include pressing, cooking, defatting, milling, and screening. This process creates animal protein meals that are sold for livestock. Specialized air classification technology separates the finer powder meal from the coarse meal. The resulting air classified fines fraction contains higher protein/ lower ash which can be sold for premium value domestic animal pet food products (dogs & cats) or for aquaculture feed products (fish). At the same time, the air classified coarse fraction can still be sold as the regular protein/regular ash feed meal product for livestock animals.

PROVEN RESULTS

Air classification has been proven to reduce the ash content and increase the protein content in every species of animal meals tested.

Below are several examples of the air classifier’s performance with various animal protein meals. Typical results include reduction of ash content as low as 5- to 7-percent and an increase of protein levels by 3- to 5-percent, which is suitable for the ultra-premium pet food grade market.

ANIMAL PROTEIN MEALS	ASH	PROTEIN	RESULTS
POULTRY & CHICKEN MEAL	17% ash down to 10-12%	67% protein up to 70-75%	5-7% ash reduction & 3-5% protein increase
LAMB MEAT & BONE MEAL	27% ash down to 14-21%	56% protein up to 60%	6-13% ash reduction & 4-5% protein increase
PORCINE/PORK MEAT & BONE MEAL	27% ash down to 17-21%	53% protein up to 57-61%	6-10% ash reduction & 4-8% protein increase
FISH MEAL	21% ash down to 14-18%	62% protein up to 64-68%	3-7% ash reduction & 2-6% protein increase
BOVINE/BEEF MEAT & BONE MEAL	33% ash down to 25-29%	50% protein up to 52-59%	4-8% ash reduction & 2-9% protein increase
DUCK MEAL	24% ash down to 11-17%	58% protein up to 64-69%	7-13% ash reduction & 6-11% protein increase

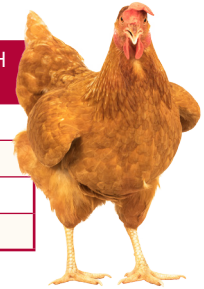
CONTROLLING THE QUALITY OF PET FOOD & AQUACULTURE PRODUCTS

The Sturtevant Whirlwind Air Classifier uses an internal fan to fluidize the protein meal and mechanical selector blades to separate the animal feed meal into a fines fraction and a coarse fraction. This process is much more selective and versatile than cyclones or screens and the air classifier also does not clog like fine screens do. By changing the quantity of selector blades, a wide range of low ash, high protein products can be made with the machine. Once the best selector blade setting is determined, operators can simply dial-in a speed adjustment using a variable speed drive to fine-tune the desired product specifications or to compensate for any unexpected changes in the composition of the raw materials (ash, protein, fat, moisture). In all cases, there is a controllable relationship between protein/ash levels and output yields of the fines fraction (lower ash/higher protein) and the coarse fraction (regular ash/regular protein).



Below is an example of this relationship, using poultry meal:

PROTEIN INCREASE	ASH DECREASE	YIELD OF HIGHER PROTEIN/LOWER ASH FINES PRODUCT	YIELD OF REGULAR PROTEIN/ASH COARSE PRODUCT
Increase by 6%	Decrease by 7%	16% of feed rate	84% of feed rate
Increase by 4%	Decrease by 5%	26% of feed rate	74% of feed rate
Increase by 3%	Decrease by 4%	32% of feed rate	68% of feed rate
Increase by 2.5%	Decrease by 3%	44% of feed rate	56% of feed rate



Below is another example of this relationship, using fish meal:

PROTEIN INCREASE	ASH DECREASE	YIELD OF HIGHER PROTEIN/LOWER ASH FINES PRODUCT	YIELD OF REGULAR PROTEIN/ASH COARSE PRODUCT
Increase by 10%	Decrease by 8%	20% of feed rate	80% of feed rate
Increase by 8%	Decrease by 7%	30% of feed rate	70% of feed rate
Increase by 6%	Decrease by 4%	40% of feed rate	60% of feed rate
Increase by 4%	Decrease by 3%	50% of feed rate	50% of feed rate



CAPACITY vs ENERGY

The Whirlwind Air Classifier has only one motor that controls the entire machine. The motor rotates a feed distribution plate that scatters the meal into an open area. The same motor rotates an internal fan creating updraft airflow that accelerates finer/lighter protein particles, separating them from coarser/heavier ash particles. The motor also rotates a series of selector blades that reject some of the undesirable near size ash particles. By using only one motor, the energy consumption is very low (approximately 3-5 HP per TPH of feed capacity). Below is a chart that outlines the various models with their relative motor HP and rate feed capacities. The Whirlwind Air Classifier features an internal fan and air recycle design that does not require auxiliary equipment (baghouses, cyclones, or ductwork) to capture the lower ash and higher protein fine product. The fluidized meal is also resistant to major clogging because the machine has minimal dead zones where high fat and sticky material can settle. This makes the air classifier both low in maintenance and reliable for continuous use.

WHIRLWIND® AIR CLASSIFIER

MODEL	HP	AIR FLOW VENT (CFM)	FEED RATE (TPH)	APPROXIMATE WEIGHT		HEIGHT		DIAMETER		MIN. CLEARANCE	
				(LBS)	(KG)	(FT)	(MM)	(FT)	(MM)	(FT)	(MM)
3'	7.5 – 10	65 – 125	0.5-1	1,500	680	6' 7"	2007	3' 3"	991	3' 0"	914
4.5'	10 – 15	75 – 150	1-3	2,400	1089	8' 8"	2642	4' 10"	1473	3' 0"	914
6'	15 - 25	90 - 175	2-5	6,800	3084	10' 9"	3277	6' 4"	1930	3' 8"	1118
8'	20 - 30	150 - 300	4-8	9,500	4309	13' 0"	3962	8' 4"	2540	4' 8"	1422
10'	30 - 40	190 - 375	6-14	13,000	5897	15' 8"	4775	10' 4"	3150	4' 8"	1422
12'	40 - 50	275 - 550	10-20	18,500	8392	19' 1"	5817	12' 4"	3760	5' 6"	1676
14'	50 - 75	400- 800	13-27	21,500	9752	21' 1"	6426	14' 5"	4394	5' 6"	1676

SUMMARY

Once the classifier was in full production, the protein meal producer found that they could reduce ash content to as low as 5- to 7-percent and increase protein levels by 3- to 5-percent, which is suitable for an ultra-premium pet-grade market.