



PLASMA PRODUCTION & BIOSAFETY FACT BOOK

CRITICAL INFORMATION FOR VETERINARIANS, NUTRITIONISTS AND PRODUCERS REGARDING THE COLLECTION AND PRODUCTION OF SPRAY-DRIED ANIMAL PLASMA

Since 1981, APC has researched and manufactured plasma functional proteins for use in animal diets. Over the course of 35 years, we have grown to become the largest producer of high quality functional proteins, supplying ingredients for livestock producers, feed manufacturers and pet food companies on a global basis. We remain dedicated to producing safe and effective products that improve the lives of animals.

This booklet provides a virtual tour of our Denison, Iowa, manufacturing facility which utilizes the latest technology for biosafety and handling procedures for producing spray-dried plasma functional proteins.

DID YOU KNOW:

The introduction of plasma in swine diets was ranked #6 on the American Society of Animal Science's list of "Top Ten Discoveries in the Past 100 Years in Swine Nutrition" at their 2008 conference.

#6
AMERICAN
SOCIETY OF
ANIMAL SCIENCE

APC operates 17 manufacturing facilities across the globe including in the United States, Canada, Brazil, Argentina, England, Ireland, Poland, Spain and China.

17
MANUFACTURING
FACILITIES

APC is a founding member of the North American Spray Dried Blood and Plasma Producers Association, a working group within the American Feed Industry Association.

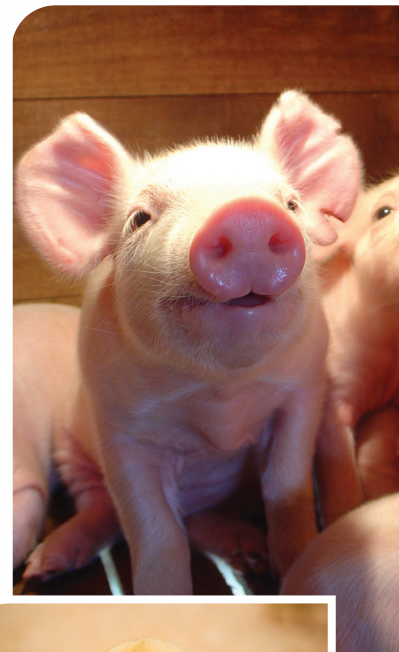
**FOUNDING
MEMBER**

APC has been granted more than 20 patents in the United States and Europe related to collecting, processing and feeding blood and plasma proteins.

**MORE THAN
20
PATENTS**

There are more than 600 published, peer-reviewed journal articles documenting the mode of action, safety and efficacy of plasma proteins across species.

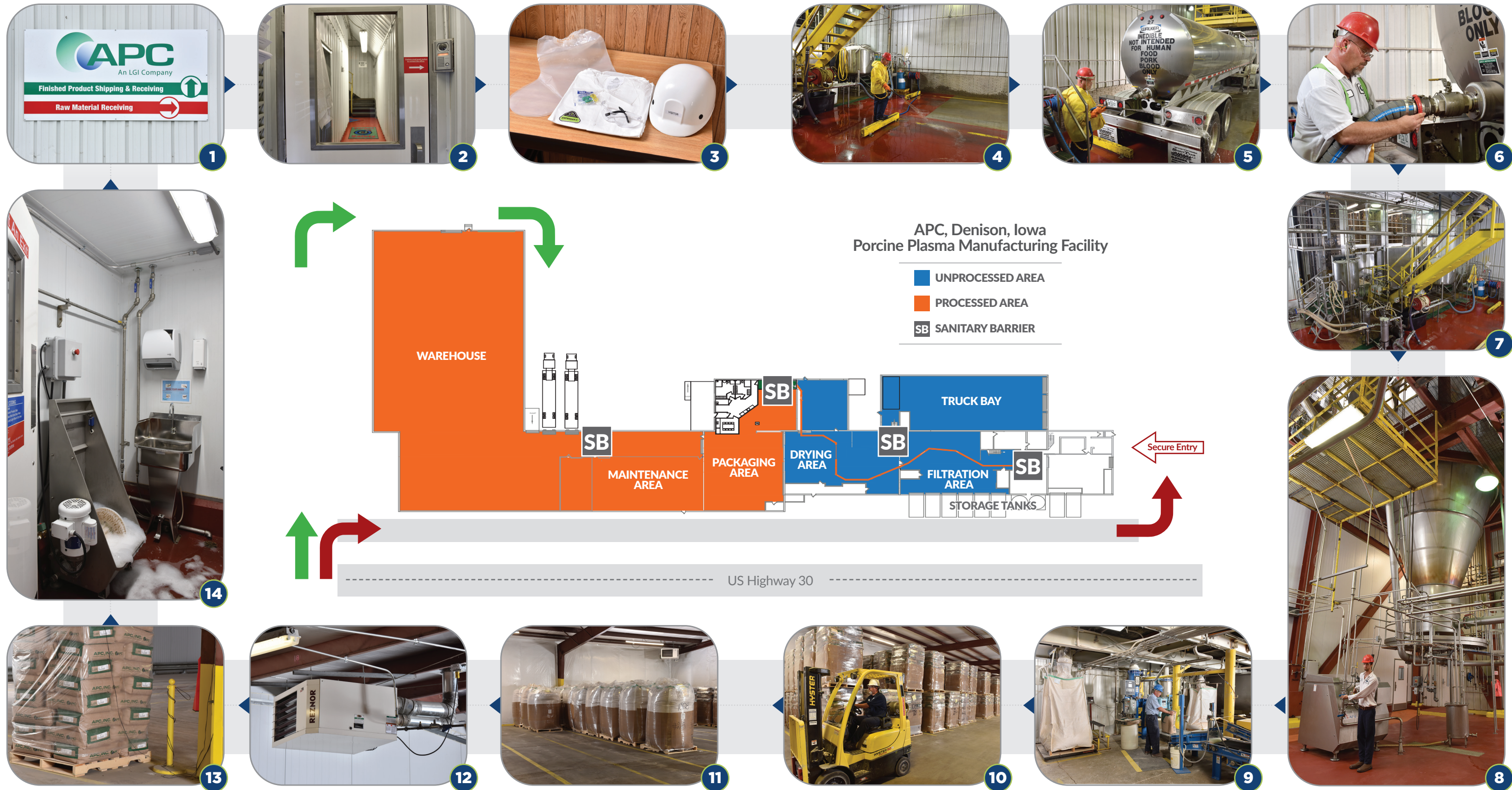
600+
PUBLISHED
PEER-REVIEWED
JOURNAL ARTICLES



HOW PLASMA IS HANDLED FROM ARRIVAL THROUGH OUTBOUND SHIPMENT



Access to APC facilities is controlled with established flows for raw material and finished goods as well as restricted entry points with monitoring capabilities (1,2). Visitors are logged and must comply with entry rules as well as wear provided gear (3). Employees and visitors pass through multiple sanitary barriers in the facility (14). Strict sanitation and unloading protocols are followed when receiving raw material including verification of the tanker seal and raw material quality parameters (4,5,6). Liquid plasma is held in insulated storage tanks until it is processed through our computer controlled UV Photopurification and concentration systems (7).



Plasma is spray dried with 80° C minimum throughout substance (8). Plasma is packaged only in all new materials including pallets, totes and bags (9). Equipment and employees are dedicated to either wet side or dry side operations (10). Employees and visitors wear color coded uniforms for their designated areas (8,9,10). Finished, packaged products are stored in our temperature controlled warehouse at 20°C for 14 days (11,12). Pallets are monitored via probes to ensure temperature is maintained throughout the holding period (13). Dock plates are sanitized between finished good load outs. Sanitary barriers are located throughout the plant (14).

BIOSAFETY & HANDLING PROCEDURES FOR PLASMA

EMPLOYEE & VISITOR ENTRY CONTROLS

- All Employees trained on various aspects of bio-safety including Quality, SOP and Food Safety
- All Contractors trained for biosafety prior to plant entry
- Training on outside contact with Livestock: other livestock or livestock facilities (beef, pork, poultry)
- SOP for internal employees with direct contact to livestock and/or facilities prior to work (clean clothes, footwear, proper hygiene prior to plant entry for work).
- Visitor log book to identify and confirm no contact with livestock in prior 24 hours

RAW MATERIAL HANDLING PROCEDURES

- Species dedicated tankers for raw material
- Tanker sealed and serial tag applied at packing house
- Unload hose connections sized by species
- SOP for sanitizing the connections before hook up and unloading
- Sanitizer applied to unload area prior to truck staging
- Raw material truck driver access to plant is controlled
- Dedicated uniforms and footwear for workers in unload area
- SOP for Sanitary Barrier and entry into further processing area
- CIP of tankers after each unload with seal and serial tag applied

RAW MATERIAL PROCESSING

- Aseptic collection SOPs of all in-process samples
- UV light photopurification dosing system for raw product
- All water flows direct to drain to minimize floor moisture
- No uncontained/uncovered raw product tanks
- All CIP procedures and concentrations are logged

PRODUCTION MONITORING

- Computer Controlled Monitoring and Adjustments
- Continuous records - temperatures
- Hourly records – flow rates, moistures

UNPROCESSED / DRY SEPARATION

- Specified path for moving from wet to dry
- Sanitary Barrier stations between wet and dry areas
- Fork lifts are dedicated to wet and dry areas
- Color coded uniforms/smocks for wet and dry work areas
- Dedicated welfare/locker-rooms for wet/dry employees

DRYING PROCEDURES

- CCP of 80° C minimum throughout substance; maintain outlet air temperatures on dryers
- Data monitored at plant and corporate headquarters via continuous tracking with alarm
- SOPs for unanticipated shut down

MAINTENANCE CONTROLS

- Control flow of maintenance personnel and equipment from wet to dry
- Separate maintenance tool boxes for wet/dry areas
- Sanitation protocols and measures for tools and parts moving between wet/dry areas
- Sanitation measures for new equipment entering plant (dry side)

FINISHED PRODUCT STORAGE

- Controlled finished product sampling
- Packaged material is stored in a controlled environment for 14 days @ 20° C
- Warehouse temperature controls throughout
- Several monitored probe locations 3 feet above floor
- Probes are placed in the middle of the pallet with alarms to assure temperature is maintained throughout holding period
- Finished product is covered with fitted plastic pallet covers
- Temp of 72° F triggers alarm email

OUTBOUND FINISHED MATERIAL PICK UP

- Separate truck paths for raw and finished trucks
- Sanitizer applied to dock leveler system between load outs
- Trucks visually inspected for cleanliness prior to loading
- Truck driver access to the plant is limited to a controlled area
- APC employee passes thru sanitary barrier for paperwork

**FOR ADDITIONAL INFORMATION OR
TO SCHEDULE A TOUR, CONTACT
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