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Hatchery Ventilation Air Conditioning vs. Evaporative Cooling

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Presented at the 2001 US POULTRY AND EGG ASSOCIATION
HATCHERY-BREEDER SEMINAR - ATLANTA, GEORGIA

The Purpose of Hatchery Ventilation

- Provide adequate volumes of fresh air to each hatchery area.
- Control the best temperature and humidity conditions for the eggs, incubation equipment and chicks.
- Control the desired static air pressure in each hatchery area.

Broiler Performance Data (Region) Live Production Cost					
	SW	Midwest	Southeast	Mid-Atlantic	S-Central
Feed cost/ton w/o color (\$)	131.39	118.23	131.17	132.09	128.34
Feed cost/lb meat (¢)	12.02	11.06	12.13	12.78	11.91
Days to 4.6 lbs	43	43	43	44	44
Chick cost/lb (¢)	3.81	3.67	3.90	3.54	4.07
Vac-Med cost/lb (¢)	0.05	0.02	0.07	0.03	0.05
WB & 1/2 parts condemn. cost/lb	0.18	0.17	0.15	0.19	0.22
% mortality	3.66	4.01	3.71	4.13	4.63
Sq. Ft. @ placement	0.83	0.79	0.82	0.81	0.80
Lbs./Sq. Ft.	6.50	6.79	6.40	6.96	6.12
Down time (days)	18	18	16	17	17

Data for week ending 11/17/01

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Most Common Ways to Ventilate A Hatchery

- Evaporative cooling with exhaust fans and heaters, • Air conditioning (combination heat and cooling units).

Evaporative Cooling Systems

Evaporative cooling has been used to ventilate hatcheries since the late 1960's. The coolers should be roof mounted and operate in conjunction with wall exhaust fans. Roof top heaters (usually gas fired) are used with these systems to provide heat in cold weather. All this equipment is operated with thermostats. If the coolers and exhaust fans go off, the fresh air blowers on the heaters start operating. If the temperature in a room drops, the heaters start heating.

- Evaporative cooling is the most energy efficient method of cooling a hatchery, using about two-thirds the energy as air conditioning systems during the peak cooling months. • These systems are environmentally safe. • The systems cool with dry air moving over wet pads. The moisture in the pads evaporates and the air gives up its heat. • The more water that is absorbed into the air the lower the temperature. The drop in temperature from these units varies with the relative humidity. Evaporative cooling is less effective in areas with high humidity. • Since these systems move about six times more fresh air than air conditioning systems, they can provide adequate conditions in the incubator, hatch and chick rooms.
- **Remember.** Fresh air is a good sanitizer. Evaporative cooling brings 100% fresh air into the rooms. • Hatcheries located in elevations above 1500 feet usually have lower humidity levels. This is an advantage for evaporative cooling. • The humidity in the rooms can be higher with the use of evaporative cooling. • Multiple units in an area provide protection against equipment breakdowns. • Multiple units eliminate the need for air distribution bags and long ducts which are dirt collectors. • The equipment can be maintained by hatchery personnel. • Back draft dampers installed in the cooler ducts allow control over the air pressure in the rooms when the units are not running. These dampers save a lot of energy in cold weather, especially on windy days. • The dampers eliminate the need to cover the coolers in cold weather. • Do not use plastic pads in the coolers as they do not absorb moisture. The room temperatures are about 12 degrees (F) warmer with plastic pads. • Adjustable motor pulleys on the coolers and exhaust fans allow setting of the static air pressure in each area. • Motor pulleys should be replaced when they get rusty or worn. These pulleys normally last 3-5 years.

Air Conditioning Systems

Interest in mechanical air conditioning/heating (combination) systems developed in the 1970's. These systems deal with minimum volumes of fresh air and provide better control of the room conditions. The use of air conditioning greatly reduces the number of pieces of equipment needed to ventilate the hatchery. • The roof of older buildings will need strengthening if heavy air conditioning units are to be installed. • Two smaller units rather than one large unit should be used in a room.

- The limited number of units in each area means that a breakdown is serious. • A reliable outside service company is usually required for repairs. • The harsh environment of a hatchery requires that only top quality units be used. Off the shelf units do not stand up as units operate 100% of the time. • Unless high quality units are used, cleaning and normal maintenance can be a problem. • Funds should be included in the annual budget for major, high cost repairs. • Air condi-

Broiler Performance Data (Company) Live Production Cost

	Average Co.	Top 25%
Feed cost/ton w/o color (\$)	130.18	121.66
Feed cost/lb meat (¢)	12.11	11.07
Days to 4.6 lbs	44	44
Chick cost/lb (¢)	3.94	3.53
Vac-Med cost/lb (¢)	0.05	0.01
WB & 1/2 parts condemn. cost/lb	0.18	0.14
% mortality	3.93	3.20
Sq. Ft. @ placement	0.80	0.77
Lbs./Sq. Ft.	6.41	6.54
Down time (days)	17	18

Data for week ending 11/17/01

Broiler Whole Bird Condemnation (Region)

	SW	Mid-West	S. East	Mid-Atlantic	S. Central
% Septox	0.199	0.293	0.183	0.307	0.333
% Airsac	0.074	0.049	0.099	0.091	0.088
% I.P.	0.129	0.030	0.037	0.420	0.045
% Leukosis	0.001	0.002	0.001	0.006	0.003
% Bruise	0.013	0.005	0.016	0.010	0.008
% Other	0.011	0.006	0.010	0.006	0.025
% Total	0.429	0.385	0.346	0.462	0.501
% 1/2 parts condemnations	0.425	0.606	0.397	0.391	0.475

Data for week ending 11/17/01

tioning units have a high operating cost during the cooling cycle. • The motor pulleys on these units should be replaced when they get worn. Rusty or grooved motor pulleys can greatly reduce the life of the belts. • The cooling coils require frequent inspection and cleaning. • Recirculated air contains chick down and other debris which clogs the evaporator coils. • the evaporator coils and blowers on these units usually deteriorate quickly in a hatchery environment. • The evaporator coils can be treated with a phenolic coating to make them last much longer than unprotected coils. There is no need to coat the condenser coils.

If the evaporator coils are to be covered with a phenolic coating, the manufacturer of the equipment sends the coils off for treatment before the air conditioning units are built.

The phenolic coating is a four-step immersion process.

- 1) Etch prime
- 2) Epoxy polyamide
- 3) Epoxy modified phenolic
- 4) Phenolic sealer

The thermal efficiency loss of the coated coils is less than 1%. Cleaning of the coated coils is much easier to accomplish. The life of the coated coils is usually 5 to 10 times longer than uncoated coils.

The following table shows the cost of coating the evaporator coils.

Unit Size	Cost	Unit Size	Cost
2-4 Ton	\$1,930	5-7 Ton	\$2,030
8-10 Ton	\$1,990	13-15 Ton	\$2,120
16 Ton	\$3,000	20-25 Ton	\$3,250
26-30 Ton	\$4,500		

Static Air Pressure in Rooms

Controlling the proper static air pressure in each hatchery area is cost effective and reduces the risk of contamination.

If a positive air pressure is provided in a room with open exhaust ducts on the incubation systems, a lot of conditioned room air can be forced out of the ducts, When this happens, the machine exhaust air can enter the room.

Positive or negative conditions in any area can allow air movement between rooms. This can create a major contamination risk, unless the air is moving in the proper direction. (Preferably toward the chick pull area or the dirty side of the tray wash room.)

Regardless of the type of room controls. Magnehelic gauges should be used in each hatchery area to monitor the air pressure. The hoses from these gauges should be run to the outside horizontally. If the hoses run upwards, the pressure will read 0.01" W.C. more positive for every 10 feet of elevation. The end of these hoses should be located at least 10 feet from any air moving equipment. Filters should be installed on the end of the hoses to prevent bugs and moisture from making the gauges inoperable. Inexpensive in line gas filters work well for this.

Hatchery Humidity Systems

Proper humidity levels are needed in each hatchery area.

- In the egg room, proper humidity levels will prevent egg dehydration.
- In the incubator and hatch rooms proper humidity levels must be provided for the incubation equipment. Proper room conditions will allow the incubation equipment to function more easily. If the incubation equipment has to build its own humidity, the machine heaters will operate longer. This greatly increases energy consumption as the heaters dry the air resulting in the humidity operating more frequently. When the heaters operate, the fresh air entering the machines is reduced. This can lead to increased embryonic mortality for the eggs past 10 days of incubation.
- Adequate humidity in the chick processing areas will prevent chick dehydration. This is especially important if the chicks are held overnight.

Three types of humidifiers commonly used in hatcheries:

1) Pneumatic or Air Driven Humidifiers

- These units are inexpensive to purchase but expensive to operate.
- These units require 40 to 100 horsepower air compressors to provide large volumes of air for operation.
- Weekly sanitation is required for these systems.

2) Bahnsen Centrifugal Humidifiers

- These units cost between \$1,200 and \$1,600 each.
- The units have a high capacity and are not recommended for rooms with low ceilings.
- The units are very noisy due to a high capacity fan.
- Weekly sanitation is required for these units.

3) Central Humidity and Fogging Systems

- These systems cost between \$15,000 and \$23,000 depending on the size of the hatchery.
- One 7.5 horsepower pump can operate a small hatchery. Two pumps are usually required for hatcheries with more than 20 incubation systems. The pumps are less costly to operate than units requiring large air compressors.
- The system operates with high water pressure. High pressure hoses run throughout the building to distribute the water.
- Anti drip nozzles are installed on the air discharge ducts of the ventilation equipment. These nozzles create a fine mist to provide humidity to each area.
- Since this is a closed system, weekly sanitation is not required. A disinfectant metering unit can be easily fitted into the system.

Hatcher Exhaust Plenums

Many hatcheries have installed exhaust plenums, behind their existing hatcher. Almost all new hatcheries install plenums when the machines are installed. The plenums eliminate the need for individual exhaust ducts.

To create the plenums, the area behind the machines is closed off and the air from the hatcher is exhausted into this area. The air from the plenums is then moved to the outside.

Things to consider when installing exhaust plenums.

- When using Jamesway machines, the hatcher exhaust duct boots should be inverted directing the air to the plenum floors. If the boots are not used, air can move from the plenum into the hatcher. It is difficult to maintain the relative humidity in the hatcher if the exhaust duct boots are not used.
- When installing plenums for Chick Master machines, the exhaust holes in the top of the hatcher are moved to the rear of the machines. Plastic elbows can be installed in the exhaust holes at the rear of the hatcher to prevent the plenum air from entering the hatcher.
- If designing a new hatchery for exhaust plenums, the area behind the hatcher should be three to four feet wide.
- If any of the hatcher in a plenum bank are used, all the machines in that bank need to operate until all the chicks are removed. This will prevent dirty air from entering the empty machines and keep the air in the full hatcher moving. Remember that air follows the path of least resistance.
- Humidity nozzles can be installed in the plenums to dampen the floors. This will help contain most of the chick down.
- Floor drains of the trough type are helpful when cleaning the plenums.
- Good lighting should be provided in the plenums. These lights should not operate when eggs or chicks are in the hatcher as the chicks will migrate to the rear of the trays and overheat.
- The static air pressure in the plenums should be controlled at a balanced to 0.0025 negative pressure. Air should not be pulled out of the hatcher.
- If the hatcher are on an outside wall, a free flow system can be used to get the air out of the plenums. The hole in the outside wall should be designed using a formula of 1.2 square feet of opening for each hatcher. A duct of the same size should then be installed in the opening and turned down toward the ground. This duct and turn down will prevent the wind from stopping the exhaust air. This system works well, especially in warm climates.
- If extractor fans are used, they should operate even when the hatcher are empty as contamination problems can develop due to the lack of air movement.
- Air pressure gauges should be installed in the hatch room to allow a visual indication of the air pressure in each plenum.
- An air gap under the plenum door provides a safety valve for the exhaust air if the extractor fan motor fails. If the fan motor fails, the hatcher exhaust air, chick down and formaldehyde odors will enter the hatch room indication a problem. This will create a contamination risk, however, the chicks in the hatcher will survive.
- Exhaust plenums can also be used for the incubators following the same guidelines.

Summary

Air conditioning should always be used in the hatchery egg rooms. I would not use air conditioning in a chick room due to the amount of fresh air needed and the large amount of chick down in the recirculated air. It is very important that the hatchery management and maintenance people understand the operation of the ventilation equipment and the controls. The controls for the equipment must be calibrated often.

Example of Evaporative Cooling vs Air Conditioning for an Incubator Room

The following numbers are for an incubator room with twenty incubators.

For air conditioning, two twenty-ton units would be needed. On high cooling, these two units would pull 164 amps. (34,112 watts or 34.11 kW). For an evaporative cooling system, six evaporative coolers and four exhaust fans would be needed. This equipment would pull 103 amps when the units are on high cooling. (14,688 watts or 14.69 kW).

The air conditioning equipment would use more than double the power than the evaporative cooling system.

The cost of two twenty-ton air conditioning units would be about \$26,000. The cost of six evaporative coolers, four wall exhaust fans and two gas fired heaters would be about \$23,800.

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National Meeting on Poultry Health and Processing Ocean City, Maryland, October, 2001 Use of Autogenous IBDV Vaccine

Dr. Marshall Putman, Director of Poultry Health at Wayne Farms, presented his experiences using an autogenous IBDV vaccine at the 2001 National meeting on Poultry Health and Processing held in Ocean City, Maryland. The autogenous vaccine was first used by Wayne farms in 1998. At that time their breeders were ALV-J positive and their progeny were experiencing higher than normal mortality associated with secondary infections. The bursas of the broilers showed necrosis at 15-17 days of age, while the breeders still had adequate titers to IBD. When the IBD virus was isolated, it revealed an unknown typing pattern. A challenge study was performed that showed when the birds were vaccinated using the unknown isolate they were protected from the challenge. However, those not vaccinated were susceptible to the unknown virus. A commercial vaccine company prepared the vaccine and it was administered to 45-week-old broiler breeders in lay. The offspring showed protection post challenge; however, no field data could be collected because the birds in this complex were on medicated feed to control the secondary infections. The inactivated IBDV program currently used by Wayne is to give a commercial IBD vaccine at 12 and 20 weeks with the addition of the autogenous vaccine at 20 weeks.

*Sara Throne Steinlage, DVM
MAM Candidate*

Excerpts from the latest USDA National Agricultural Statistics Service (NASS) "Broiler Hatchery," "Chicken and Eggs" and "Turkey Hatchery" Reports

meat production during the week ending November 24, 2001. Placements were up 3 percent from the comparable week in 2000. Cumulative placements from December 31, 2000 through November 24, 2001 were 6.86 billion, up 1 percent from the same period a year earlier.

Four Additional States in Weekly Program

Beginning May 16, 2001 four additional States were added to the weekly program for broiler eggs set in incubators and broiler chicks placed for meat production. The four additional States are Kentucky, Louisiana, Missouri, and Oklahoma. Data collection and weekly estimates began with the week ending April 7, 2001. Commercial hatcheries for the 19 States set a total of 201 million eggs in incubators during the week ending November 24, 2001. Broiler growers in the 19 States placed 157 million chicks for meat production during the week ending November 24, 2001.

Commercial hatcheries for the 19 States set a total of 200 million eggs in incubators during the week ending November 17, 2001. Broiler growers in the 19 States placed 148 million chicks for meat production during the week ending November 17, 2001.

October Egg Production Up 3 Percent

U.S. egg production totaled 7.33 billion during October 2001, up 3 percent from last year. Production included 6.24 billion table eggs and 1.09 billion hatching eggs, of which 1.03 billion were broiler-type and 61.0 million were egg-type. The total number of layers during October 2001 averaged 336 million, up 2 percent from the total average number of layers during October 2000. October egg production per 100 layers was 2,179 eggs, slightly above the 2,173 eggs in October 2000.

All layers in the U.S. on November 1, 2001, totaled 337 million, up 2 percent from a year ago. The 336 million layers consisted of 278 million layers producing table or commercial type eggs, 56.2 million layers producing broiler-type hatching eggs, and 2.68 million layers producing egg-type hatching eggs. Rate of lay per day on November 1, 2001, averaged 70.5 eggs per 100 layers, down slightly from the 70.6 eggs a year ago.

Laying flocks in the 30 major egg producing States produced 6.89 billion eggs during October 2001, up 3 percent from October 2000. The average number of layers during October, at 316 million, was up 3 percent from a year earlier.

Egg-Type Chicks Hatched Up 1 Percent

Egg-type chicks hatched during October totaled 36.5 million, up 1 percent from October 2000. Eggs in incubators totaled 28.3 million on November 1, 2001, down 3 percent from a year ago.

Domestic placements of egg-type pullet chicks for future hatchery supply flocks by leading breeders totaled 158,000 during October 2001, down 34 percent from October 2000.

Broiler Hatch Up 4 Percent

The October 2001 hatch of broiler-type chicks, at 740 million, was up 4 percent from October of the previous year. There were 583 million eggs in incubators on November 1, 2001, up 3 percent from a year earlier.

Leading breeders placed 6.70 million broiler-type pullet chicks for future domestic hatchery supply flocks during October 2001, up slightly from October 2000.

Turkey Eggs in Incubators on November 1 Up 5 Percent From Last Year

Turkey eggs in incubators on November 1, 2001, in the United States totaled 30.8 million, up 5 percent from November 1 a year ago. Eggs in incubators were up 2 percent from the October 1 total of 30.3 million. Regional changes from the previous year were: East North Central, up 6 percent; West North Central, up 4 percent; North and South Atlantic, up 12 percent; South Central, up 2 percent; and West, down 16 percent.

Broiler Eggs Set In 15 Selected States Down Slightly

According to the latest National Agricultural Statistics Service (NASS) reports, commercial hatcheries in the 15-State weekly program set 180 million eggs in incubators during the week ending November 24, 2001. This was down slightly from the eggs set the corresponding week a year earlier. Average hatchability for chicks hatched during the week was 82 percent. Average hatchability is calculated by dividing chicks hatched during the week by eggs set three weeks earlier.

Broiler Chicks Placed Up 3 Percent

Broiler growers in the 15-State weekly program placed 139 million chicks for

Poults Placed During October Up 1 Percent From Last Year

The 23.8 million poults placed during October 2001 in the United States were up 1 percent from the number placed during the same month a year ago. Placements were up 6 percent from the September 2001 total of 22.4 million. Regional changes from the previous year were: East North Central, up 9 percent; West North Central, down slightly; North and South Atlantic, up 2 percent; South Central, down 4 percent; and West, down 11 percent.

REMINDER

All previous issues of the Poultry Informed Professional are archived on our website www.avian.uga.edu under the Online Documents and The Poultry Informed Professional links.

**Broiler Whole Bird Condemnation
(Company)**

	Average Co.	Top 25%
% Septox	0.259	0.285
% Airsac	0.080	0.084
% I.P.	0.065	0.043
% Leukosis	0.003	0.004
% Bruise	0.011	0.009
% Other	0.010	0.003
% Total	0.427	0.428
% 1/2 parts condemnations	0.442	0.254

Data for week ending 11/17/01



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Meetings, Seminars and Conventions

2002 January

Jan. 3: *Poultry Mortality Compost Course*, University of Maryland Lower Eastern Shore Research and Education Center, Princess Anne, MD. Contact: Mrs. Linda Williams, Phone 410-651-9111.

Jan. 12-15: *NTF Annual Conv.*, Hilton New Orleans Riverside Hotel, New Orleans, La. Contact: National Turkey Federation, 1225 New York Ave. N.W., Suite 400, Washington, D.C. 20005. Phone 202-898-0100.

Jan. 14-15: *International Poultry Scientific Forum*, Georgia World Congress Centre, Atlanta, Georgia, USA. Contact: Yvonne Vizzier Thaxton, Executive Secretary, SPSS, Mississippi State University, Dept. of Poultry Science, Box 9665, Mississippi State, MS 39762. E-mail: spss@technologist.com

Jan. 16-18: *International Poultry Exposition Atlanta 2002*, Georgia World Congress Centre, Atlanta, Georgia, USA. Contact: US Poultry & Egg Association, 1530 Cooleedge Road, Tucker, Georgia 30084-7804, USA. Phone: +1 770-493-9401; Fax: +1 770-493-9257; E-mail: expogeneralinfo@poultryegg.org; Internet: www.poultryegg.org

2002 February

Feb. 4-8: *Industrial Refrigeration WSKSHP*, Holiday Inn-Woodlawn, Charlotte, N.C. Contact: Donald L. Fenton, 313 Rathbone Hall, Kansas State University, Manhattan, Kan. 66506. Phone 785-532-2322; or Wilbert F. Stoecker, University of Illinois, 1500 S. Maple St. Urbana, Ill, 61801, 217-384-6002.

Feb. 7: *Salmonella Short Course*, Las Vegas, Nev. Contact: Silliker Laboratories, 900 Maple Road, Homewood, Ill. 60430. Phone 800-829-7879.

Feb. 11-13: *2002 Australian Poultry Science Symposium*, University of Sydney, Sydney, NSW, Australia. Contact: Poultry Research Foundation, University of Sydney, Camden NSW 2570, Australia. Phone: +61 2 46 550 656; Fax: +61 2 46 550 693; E-mail: noelenew@camden.usyd.edu.au, Internet: www.camden.usyd.edu.au/apss.html

Feb. 22-23: *PF Spring Meeting*, Arlington Hotel, Hot Springs, Ark. Contact: Judy Kimbrell, Poultry Federation, P.O. Box 1446, Little Rock, Ark. 72203. Phone 501-375-8131.

Feb. 28-Mar 2: *AFIA*ARGO EXPO GUADALAJARA*, Jalisco, Mexico Contact: American Feed Industry Association, 1501 Wilson Blvd., Suite 1100, Arlington, Va. 22209. Phone 703-524-0810

2002 March

March 5-6: *Louisiana Poultry Seminar*, Shreveport, LA. Contact: Dr. Theresia Lavergne, Louisiana Poultry Federation, P.O. Box 25100, Baton Rouge, LA 70894-5100. Phone 225-578-2219.

March 7: *Listeria Short Course*, Nashville, Tenn. Contact: Silliker Laboratories, 900 Maple Road, Homewood, Ill. 60430. Phone 800-829-7879.

March 19-21: *MPF Conv.*, Touchstone Energy Place, RiverCentre, St. Paul, Minn. Contact: Lara Durban, Midwest Poultry Federation, 2380 Wycliff St., St. Paul, Minn. 55114-1257. Phone: 651-646-4553.

March 19- 22: *Better Process Control School*, University of Georgia, Athens, Ga. Contact: Food Processors Institute, 1350 I St. N.W., Suite 300, Washington, D.C. 20005-3305. Phone 800-235-0983.

March 21-23: *VIV Canada 2002*, Toronto, Canada. Contact: Royal Dutch Jaarbeurs, PO Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 56 62; Fax: +31 295 57 09. E-mail: canada@jaarbeursutrecht.nl.

Canadian Swine Exporters Association, PO Box 150, Hickson, Ontario, NoJ iLo, Canada. Phone: +1 519 462 2929; Fax: +1 519 462 2417. E-mail: csea@execulink.com

2002 April

April 12-13: *Florida Poultry Days*, Contemporary Resort, Orlando, FL. Contact: Florida Poultry Federation, 4508 Oak Fair Blvd., Suite 290, Tampa, FL 33610. Phone: 813-628-4551.

April 14-17: *5th International Symposium on Avian Influenza*, Georgia, USA. Contact: David E. Swayne, 934 College Station Road, Athens, Georgia 30605 USA.

FAX: +1-706-546-3161. E-mail: AI.Symposium@seprl.usda.gov Website: <http://seprl.ars.usda.gov/avian.influenza.symposium.htm>

April 23: *Delmarva Poultry Booster Banquet*, Salisbury, Maryland. Contact: Karen Adams. Phone 302-856-9037

April 24-26: *VIV China 2002*, China International Exhibition Centre, Beijing, P.R. China. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 5662; Fax: +31 30 295 5709; E-mail: viv.china@jaarbeursutrecht.nl

April 25-28: *GPF Annual Meeting*, Callaway Gardens, GA. Contact: Georgia Poultry Federation, P.O. Box 763, Gainesville, GA 30503. Phone 770-532-0473.

2002 May

May 1-4: *Western Poultry Disease Conference and Asociacion Nacional de Especialistas en Ciencias Avicolas*, Marriott Casamagna Resort, Puerto Vallarta, Mexico. Contact: Dr. R.P. Chin, 2789 S. Orange Ave., Fresco, CA 93725, USA. E-mail: rpchin@ucdavis.edu

May 2-3: *National Breeders Roundtable*, Airport Marriott Hotel, St. Louis, MO. Contact: US Poultry & Egg Association, 1530 Cooleedge Road, Tucker, GA 30084-7303. Phone 770-493-9401.

May 6-8: *VIV Africa 2002*, Ceasars, Johannesburg, South Africa. Contact: Avi Africa. P.O. box 1202, Honeydew 2040, South Africa. Phone: +27 11 794 5453; Fax: +27 11 794 3367; E-mail: aviafrica@mweb.co.za.

May 6-9: *Pepa Annual Conv.*, Harrah's Stateline Hotel, Lake Tahoe, Nev. Contact: Pacific Egg & Poultry Association, 1521 1st., Sacramento, Calif. 95814. Phone 916-441-0801.

May 18: *GPF Night of Knights*, Cobb Galleria, Atlanta, Ga. Contact: Georgia Poultry Federation, P.O. Box 763, Gainesville, Ga. 30503, Phone 770-532-0473.

Meetings, Seminars and Conventions

May 21-23: *Avicola 2002*, La Rural, Buenos Aires, Argentina. Contact: K.J. Krause & Associates, 6550 Rock Spring Drive, Suite 500, Bethesda, Md. 20817-1126. Phone 301-493-5705.

May 27-31: *X International Seminar in Avian Pathology and Poultry Production (In Spanish)*, Georgia, USA. Contact: Dr. Pedro Villegas, Department of Avian Medicine, The University of Georgia, Athens, GA 30602-4875, USA. Fax: +1-706-542-5630;

E-mail: sem2002@arches.uga.edu

May 30-June 1: *VIV Poultry Yutav 2002*, Istanbul, Turkey. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 56 62; Fax: +31 30 295 57 09;

E-mail: viv.yutav@jaarbeursutrecht.nl

2002 June

June 21-22: *Delmarva Chicken Festival*, Seaford, Delaware. Contact: Connie Parvis. Phone 302-856-9037.

2002 August

Aug 19-23: *The 7th World Congress of Genetics Applied to Livestock Production*, Le Corum Conference Centre of Montpellier, France: Contact: <http://wcgalp.toulouse.inra.fr>

2002 September

Sept. 6-10: *11th European Poultry Conference*, Bremen, Germany. Contact: 11th European Poultry Conference, 2002, Congress Partner, Birkenstr 17, D-28195 Bremen, Germany. Phone: +49 421 303130; Fax: +49 421 303133; E-mail: Bremen@cpb.de.

Sept. 11: *Delmarva Breeder, Hatchery & Grow-out Conference*, Delmar, Maryland. Contact: Bud Malone, University of Delaware Phone 302-856-7303.

Sept. 24-26: *VIV América Latina*, Sao Paulo, Brazil. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 57 09; Fax: +31 30 295 57 09; Email: viv.america.latina@jaarbeursutrecht.nl

Sept. 24-26: *VIV/AFIA Feed*, Sao Paulo, Brazil. Contact: Royal Dutch Jaarbeurs, P.O. Box 8500, 3503 RM Utrecht, the Netherlands. Phone: +31 30 295 57 09; Fax: +31 30 295 57 09; Email: viv.feed@jaarbeursutrecht.nl

2002 October

Oct. 6-10: *7th WPSA Asian Pacific Federation Conference*, Conrad Jupiter's Hotel, Gold coast, Queensland, Australia. In conjunction with 12th Australian Poultry & Feed Convention. Hotel Conrad, Jupiters Casino, Gold Coast, Queensland, Australia. Contact: APFC 2002 Conference Managers, GPO Box 128, Sydney, NSW 2001, Australia. Phone: +61 2 9262 2277; Fax: +61 2 9262 3135; E-mail: apfc2002@tourhosts.com.au; Internet: <http://www.tourhosts.com.au/apfc2002>

Oct. 6-11: *3rd International Workshop on the Molecular Pathogenesis of Marek's Disease and the Avian Immunology Research Group Meeting*, Dead Sea, Israel. Contact: MAREKS-AIRG at Target Tours, P.O. Box 29041, Tel Aviv 61290, Israel. Phone: +972 3 5175150; Fax: +972 3 5175155; E-mail: mareks-airg@targetconf.com

Oct. 8: *Delmarva Poultry Industry, Inc., Annual Membership Meeting*, Delmar, Maryland. Contact: Lori Morrow. Phone 302-856-9037.

Oct. 9-11: *National Meeting on Poultry Health & Processing*, Sheraton Fountainbleau Hotel, Ocean City, Maryland, USA. Contact: Karen Adams, Delmarva Poultry Industry, Inc., 16686 County Seat Highway, Georgetown, DE 19947-4881. Phone: 302-856-9037; Fax: 302-856-1845.

2002 November

Nov 12-15: *EuroTier 2002*, International Exhibition for Livestock and Poultry Production, Hanover, Germany. Contact: Website: www.eurotier.de

2003 July

July 19-23: *XIII Congress of the World Veterinary Poultry Association*, Denver, CO, USA. Contact: Details are not currently available but will eventually be posted on the web site of the American Association of Avian Pathologists.