



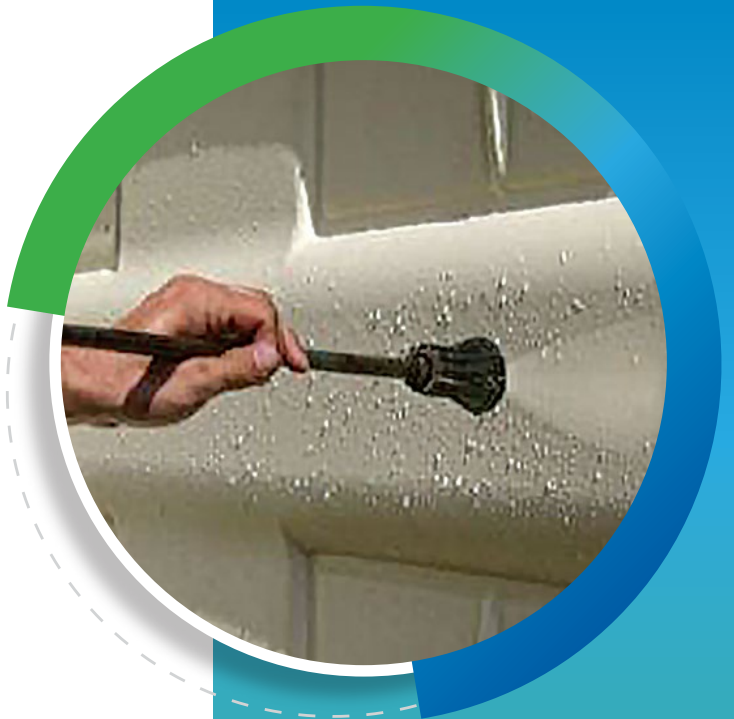
Your **Calf Biosecurity** Program: *Protecting Your Most Important Assets!*



Acephsis[™] — an ounce of prevention for Water, Animal and Facility Biosecurity.

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Acepsis™, LLC

WHO WE ARE

ACEPSIS™, LLC is a Wisconsin-based animal wellness company that is focused on the development of state-of-the-art animal hygiene technologies.

Our Company's mission is to apply innovative animal hygiene technologies into animal agricultural and veterinary market sectors, improving the wellness of the animals and agricultural production sustainability.



WHAT WE DO

Acepsis™ is focused on the development of chlorine dioxide-based technologies within a wide range of agricultural hygiene applications, from facility and animal hygiene applications to water treatment.

We offer animal focused hygiene products that are developed to integrate with Standard Operating Procedures.



OUR AREAS OF SPECIALTY

In addition to providing optimal Acepsis™ products for water, facility and animal hygiene, we utilize a "Best Practices" approach that strengthens the product results. We also provide the tools that can determine the effectiveness of the hygiene practice, and potentially determine the source of any hygiene problems.

Acepsis™, LLC

OVERVIEW: WHAT IS BIOSECURITY?

Simply defined, Biosecurity refers to measures aimed at preventing the introduction and / or spread of harmful organisms to animals and plants to minimize the risk of transmission of infectious disease (Wikipedia).



This booklet will focus on basic disease prevention protocols and practices that will strengthen your animal wellness program. We will address the primary areas of sanitation and hygiene within the pre-weaned calf raising areas.

We will also provide practices that have been successfully implemented on individual dairies that may be of benefit to a wider range of applications. While no two dairy facilities are built or managed in the same way, it should be helpful to develop a “best practices” approach to improved hygiene procedures within the biosecurity process.



Although monitoring and documenting the effectiveness of a sanitation protocol is important, the identification and isolation of sick animals may also need to be implemented to prevent the further spread of disease.

In an effort to better manage the calf development process, the following hygiene practices have been identified.

CALF BIOSECURITY — THE BASICS

Biosecurity Management Practices

- **1** **STEP 1**
Create a visitor / new animal entry area.
- **2** **STEP 2**
Sign in all visitors to facility logbook.
- **3** **STEP 3**
Restrict entry to maternity and calf raising areas of unauthorized visitors.
- **4** **STEP 4**
Have authorized visitors / employees change into protective clothing upon entering a farm. Wear clean, washable boots, gloves, and coveralls.
- **5** **STEP 5**
Quarantine all animals that have been brought into farm. Keep separate from other animals.
- **6** **STEP 6**
Report serious or unusual animal health problems to your veterinarian immediately.
- **7** **STEP 7**
Initiate a **Calf Biosecurity Hygiene Program.**

CALF BIOSECURITY – HYGIENE PRACTICES

Dr. Scott Earnest, DVM, Director of Technical Services with ProAGtive Technologies, LLC, identifies the key Calf Biosecurity Hygiene practices of focus.

“Typically, I suggest that the subject of ‘calf hygiene’ be broken up into 5 key areas:”



1. **Maternity Area**
2. **Clean First Steps**
3. **Wet Calf Environment**
4. **Feeding Equipment Hygiene**
5. **Measuring Success**

1. MATERNITY AREA

“Research shows that the first 24 hours of a calf’s life are the most critical. Newborn calves have a delicate immune system, leaving them vulnerable to many disease-causing pathogens within their environments. It is therefore important that we focus on the environmental conditions that a calf is born into.”

The Physical Layout of Maternity Pens

It is important to provide a cow with a separate calving area that allows workers the ability to maintain a close watch over the expectant animals. The area should be:



- Disinfected (Spray flooring with **HabiStat™** chlorine dioxide – 100 PPM / 700+ mV ORP or use **HabiShield™** drying powder. Let area dry prior to providing new bedding and bringing in expectant cow)
- Well bedded (6" of bedding on top of dirt / sand / concrete or clay flooring, treated with **HabiShield™** powder)
- Well ventilated (Measure ventilation level)
- Adequately sized (100 x 150 sq. ft. per pen)
- Adequate lighting is needed for observation, or if needed for possible assisting with difficult births

CALF BIOSECURITY – HYGIENE PRACTICES

2. CLEAN FIRST STEPS

Exceptional calf performance starts with the birthing process and is then followed by quality care of the newborn calf. Cows should be moved into maternity pens as close to calving as possible to maintain cleanliness (One day or less). Removal of feces / placental remains and bedding materials, along with disinfecting the floor area. Habishield™ powder helps in the removal of moisture and disease-causing pathogens.



a. Managing Colostrum

Managing colostrum may be the most important item to review when a new calf program is being evaluated. Disease prevention and treatment can be significantly minimized when colostrum management protocols are established. A calf's primary line of defense is the immunity it receives from a sufficient amount of high-quality colostrum.

b. Colostrum Quality: First milking colostrum should be creamy in color and texture, be free of bacteria, manure, urine and blood. High-quality colostrum is defined as containing more than 50 g/l of immunoglobulin G (IgG). It can be tested using a Brix refractometer with a value above 22, indicating high-quality colostrum.

c. Quantity: Calves should receive 4 quarts of clean, high quality colostrum within the first two hours of birth. This should be followed with an additional 2 quarts every 6 —> 12 hours. Colostrum should be fed via a cleaned and sanitized nipple bottle.

d. Testing Colostrum: There are several useful tests you can use to find out more about the colostrum you are feeding:

1. Colostrum IgG can be measured with a Brix refractometer, or cow-side kit can be used to estimate colostrum IgG content with enough accuracy to separate good quality colostrum (containing >50 mg/mL of IgG) from poor quality (containing <50 mg/mL of IgG).
2. Bacteria levels in colostrum can be tested in a lab that offers bacterial culture. Tests for Salmonella or Mycoplasma may be advised if there is reason to suspect these pathogens are causing problems, but these tests can be more expensive and are not needed for routine monitoring of the colostrum supply.
3. Although high quality colostrum is typically very thick and creamy, appearance alone does not reliably predict nutritional value, IgG content, or bacteria populations. Bloody or mastitic colostrum should be discarded because it has a greater risk of containing endotoxins and very high bacteria counts.

CALF BIOSECURITY – HYGIENE PRACTICES

Within 6 hours, the average ability of a calf's gut walls to absorb immunoglobulins decreases by one-third. By 24 hours, the walls absorb less than 10 percent of what could originally be absorbed.

- 4. **Feeding Equipment Hygiene:** All equipment associated with feeding calves must be cleaned and sanitized between feedings. (See Calf Feeding Equipment Cleaning for proper cleaning protocols.)



- **Separate Calf From Cow**

It is recommended that a calf be separated from its mother within one hour of calving. Reasons for early removal include ensuring adequate intake of colostrum, reducing exposure to disease pathogens, and reducing the stress on the cow and calf.

- **Keep Dry**

A wet calf is a chilly calf, and keeping them dry is essential for keeping them warm. If the birthing cow is too exhausted or disinterested to lick the calf dry after it is born, it should be carefully wiped dry with clean rags. Use of **HabiShield™** powder will allow quick drying of the calf and will reduce disease-causing pathogens. In bad weather, newborn calves should be taken indoors or under shelter, so they are not drenched with rain or snow.

- **Keep Warm**

Calves are highly susceptible to chills and hypothermia, particularly right after birth when they are still wet and may be born in cold, wet, or windy conditions. A deep layer of bedding in the barn or calving box can help keep calves warm, or a windbreak can be provided for cows in labor. If necessary, a warming box can be used to help chilled calves recuperate.



- **Keep Clean**

Newborn calves have very little resistance to infections and can be susceptible to bacteria and parasites. Bedding should be replaced as often as possible to keep it clean and dry, which will also help keep the calf warm. Use of **HabiShield™** powder will reduce the moisture in the calf pen / hutch area. Only use clean rags or cloths to wipe the calf, and always clean and sanitize equipment before using it on the calf, such as for feedings or processing.

CALF BIOSECURITY – HYGIENE PRACTICES

3. WET CALF ENVIRONMENT

The fundamental reason for housing pre-weaned wet calves is to separate the calf from its mother. Removing a calf from its mother is considered more compassionate due to lowering contact time, leaving both animals less distressed. The more time spent together, the more severe the separation response. Other reasons for moving the newborn calf into individual housing are:



- To protect them from the extreme weather conditions
- To allow the calves easy access to food and water
- To protect them from injury from larger animals
- To protect them from disease causing pathogen
- To better monitor their health and welfare.

Housing

The two primary housing types used for pre-weaned calves are calf hutches, and calf pens within a calf barn. Calves can be moved to the pre-weaned calf housing area within 24 hours of their birth. Typically, calves are moved into on-farm housing areas, or are moved off the dairy into separate rearing facilities. Most studies report that the preferred option in each case is that calves are housed in individual pens or hutches for the first days, postpartum.

- **Hutches**

Calf hutches are preferred housing when the weather elements play a lesser role. Calf hutches should provide protection from cold, wind and contain enough clean bedding to keep newborn calves warm and dry. New research from the University of Wisconsin shows that pairing calves in “buddy hutches” within one week after birth, provides improved animal health and welfare (Jennifer Van Os, PhD, from the Department of Animal & Dairy Sciences at UW-Madison).

- **Hutch advantages**

- √ Ability to house calves individually and monitor health and behavior every day, at each feeding
- √ Reduce the spread of disease from animal to animal
- √ Specific feed types can be provided
- √ Reasonable weight gains can be achieved

CALF BIOSECURITY – HYGIENE PRACTICES

- **Hutch disadvantages**
 - ✓ More labor intensive
 - ✓ Reduced potential for calf socialization
 - ✓ Difficult to clean and sanitize in between calves
 - ✓ Not easy to feed / monitor animals during cold / snowy / rainy weather conditions



- **Barns / Pens**

Like hutches, it is recommended that the initial period after a calf is removed from its mother, it should be isolated in a single pen to be monitored and minimize the spread of disease-causing organisms. The pen should be of sufficient size, be protected from adverse weather conditions, be sanitized, and contain clean bedding. The pen should have good drainage and adequate ventilation at the calf level. Like the hutch example, calves should be paired within 5 days of being removed from their mother.



- **Barn / Pen Advantages**

- ✓ Barn / pens can be cleaned in poor weather conditions
- ✓ Pens easy to pair calves. Removal of pen divider
- ✓ Calves easy to monitor / feed

CALF BIOSECURITY – HYGIENE PRACTICES

4. FEEDING EQUIPMENT HYGIENE

There is a wide variation of calf feeding equipment on dairies / calf growing facilities: from pails, bottles, nipples, milk taxis, pasteurizers to automated calf feeders. This equipment most frequently falls into the subset of manual or COP (Clean out of place) cleaning. Since the cleaning processes do not need to be documented and validated, cleaning procedures are not usually well defined. This subset covers the vast majority of equipment and requires more operator intervention to assure optimal cleanability.



The purpose of using effective, efficient, and well-documented cleaning solutions and protocols, is to provide repeatable cleaning processes to safeguard the health of the animals. COP is essentially the systematic manual cleaning and sanitizing of calf-growing / feeding equipment. Typically, this equipment needs to be manually disassembled and hand cleaned using protective equipment (eyes and kin protection) with appropriate detergents, sanitizers, tools, and cleaning equipment, at the proper cleaning temperatures.

Removal of soil when the equipment is partially or totally disassembled. Soil removal is affected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, and high or low pressure hoses, with cleaning aids manipulated by hand.

- 1. Pre-clean rinse:** Using lukewarm water, remove gross soils from the equipment. Scrub with proper brushes / cleaning devices when needed. Drain soil loaded water prior to wash cycle.
- 2. Detergent wash:** Clean equipment / components in hot water (120 → 140°F / 50 → 60°C) with a chlorinated alkaline detergent (**Chlor-A-Foam™**) with an alkalinity greater than 11.0 pH. Manual washes should have strong, foaming detergency. Vigorously scrub equipment with proper brushes / cleaning tools. Use the Hanna® Combo pH / ORP meter for proper cleaning.
- 3. Rinse cycle:** Rinse with cold water.
- 4. Sanitize cycle:** Using **HabiStat™ Concentrate** at 50 PPM Active ClO₂, spray / sanitize both the inside and outside of the feeding equipment.
- 5. Allow to air dry:** Allow equipment to air dry on a proper drying rack. Do not stack equipment on floors or boards.

(For Acepsis hygiene protocols for Maternity Area / Housing (Hutches / Pens) Area see **Appendix A: Acepsis Advanced Hygiene Technology protocols.**)

CALF BIOSECURITY – HYGIENE PRACTICES

5. MEASURING BIOSECURITY SUCCESS

Measuring biosecurity success refers to those measures taken to keep disease agents out of populations or groups of animals where they do not already exist. Calf management, especially calving management, care of the newborn, colostrum management, calf housing and feeding, as well as hygiene, all have an important effect on calf performance and health. The following provides an outline of critical management tools used for colostrum management, colostrum quality, facility and equipment hygiene.



Measurement devices

ATP Hygiene Monitoring uses a device called an ATP meter to measure how clean a surface is. A sample is taken with a special swab, inserted into the ATP meter, and a numerical value is returned. Pre-defined ranges of values determine if the surface is clean or dirty. This provides a quick, easy, and scientific method to determine if a surface is clean and free of bacteria. ATP meters can be used to measure hard surface cleanliness, and the relative bacterial levels of water.

Colostrum testing

Newborn calves (as well as pigs, foals, sheep and goats) are born without antibodies in the blood, which are critical to the proper function of the immune system.

Colostrum contains large amounts of antibodies and is the primary source of them for the calf. The newborn digestive system can absorb large molecules such as antibodies intact for only a short time after birth (approximately 24 hours). Early feeding of colostrum is essential. Colostrum testing devices include:

Refractometers

- Brix refractometer:



- Digital refractometer:



Research suggests the Brix refractometer provides an accurate method of estimating IgG in colostrum, and the Brix refractometer can be used to determine the total solids concentration of waste milk, and estimate IgG concentrations in calf serum as well.

CALF BIOSECURITY – HYGIENE PRACTICES

ORP Testing

Oxidation reduction potential, or ORP, is a measure of a substance's ability to either oxidize or reduce another substance. It is measured by the electrodes of an ORP meter. A positive reading on an ORP meter means that the substance is an oxidizing agent; a negative reading indicates that the substance is a reducing agent.



ORP (Oxidation Reduction Potential) measures the oxidizing power of a solution, providing the actual sanitizing strength of the solution being tested. Simply counting the PPM (parts per million) of a disinfectant present is misleading due to the changes of chemistry when a solution is diluted with water, or the hydrolysis of the disinfectant when mixed in water.

An ORP meter measures a dilution strength in millivolts (mV). The higher the ORP value the greater the oxidizing action and the shorter the microbial kill time in the solution.

ORP offers many advantages to "real-time" monitoring and recording of disinfection potential, a critical solution quality parameter.

Hand-held devices are affordable and are an essential backup for cross-referencing the operation of an inline ORP sensor, as are the more traditional dose-related test kits.

Measurement of Oxidizing Agent ORP Values In Pathogen Disinfection*

OXIDIZING AGENT | OXIDIZING AGENT ORP VALUE RANGE (mV)

CHLORINE DIOXIDE (ClO ₂)		600 → 1000 MV
OZONE* (O ₃)		700 → 1000 MV
IODOPHORS (I ₂)		400 → 600 MV
HYDROGEN PEROXIDE		300 → 500 MV
SODIUM HYPOCHLORITE		250 → 500 MV



*Ozone is greatly influenced by the water quality and ozonation system.

**Oxidation Reduction Potential (ORP) for Disinfection Monitoring, Control and Documentation; University of California, Trevor Suslow, Department of Vegetable Crops, University of California - Davis

ORP Values In Pathogen Disinfection**

PATHOGEN SURVIVAL IN SECONDS (S) OR HOURS (H) AT ORP LEVELS (MV)

Pathogens	<500 ORP (mV)	500 - 600	600 - 700	700+
E. COLI (0157:H7)	> 300 S	< 60 S	< 10 S	< 1 S
SALMONELLA SPP.	> 300 S	> 300 S	< 20 S	< 1 S
LISTERIA MONOCYTOGENES	> 300 S	> 300 S	< 30 S	< 1 S
THERMO-TOLERANT COLIFORM	> 48 H	> 48 H	< 30 S	< 1 S

APPENDIX A – ADVANCED HYGIENE TECHNOLOGY

- **MATERNITY AREA HYGIENE STEPS**
- **CALF FEEDING EQUIPMENT HYGIENE STEPS**
- **CALF FACILITY HYGIENE STEPS**

1		<p>Remove</p> <p>Remove all animals from targeted cleaning area, and all organic materials from maternity pen area (bedding, manure, feed, etc.).</p>	<p>Sacar / Removar</p> <p>Saque todos los animales fuera del área que se va a limpiar, y remueva toda la materia orgánica (material de lecho, estiércol, alimento, etc.) del corral de maternidad.</p>
2		<p>Soak</p> <p>Thoroughly soak rinse targeted areas, from high to low, with warm water.</p>	<p>Remojar</p> <p>Remoje para enjuagar completamente las áreas a lavar con agua tibia.</p>
3		<p>Foam</p> <p>Apply high foaming, alkaline detergent (Chlor-A-Foam®) making sure that pH level is 10.5 – 11.0 pH, allowing to soak for 5 – 10 minutes.</p>	<p>Espumar</p> <p>Aplice el detergente alcalino clorado de alta espuma (Chlor-A-Foam®) asegurándose que el nivel de pH sea 10.5 - 11.0 pH, permita que se remoje por 5 – 10 minutos.</p>
4		<p>Scrub</p> <p>Scrub surfaces vigorously with appropriate brushes for 2 minutes.</p>	<p>Restregar</p> <p>Restriegue vigorosamente las superficies por 2 minutos con escobillas adecuadas.</p>
5		<p>Rinse</p> <p>Rinse with cold water, removing all alkaline detergent.</p>	<p>Enjuagar</p> <p>Enjuague con agua fría para remover todo el detergente alcalino.</p>
6		<p>Spray</p> <p>Spray all surfaces with diluted HabiStat® Concentrate (chlorine dioxide) at 100 PPM, spraying from highest to lowest area.</p>	<p>Rociar</p> <p>Rocíe todas las superficies con HabiStat® Concentrate (dióxido de cloro) a 100 PPM, rociando las áreas desde arriba hacia abajo.</p>
7		<p>Dry</p> <p>Allow facilities to air dry prior to use.</p>	<p>Secar</p> <p>Permita que las instalaciones se sequen al aire antes del uso.</p>
8		<p>Test/Monitor</p> <p>Use an ATP Meter to determine the level of hygiene in the cleaning program.</p>	<p>Probar/Monitorear</p> <p>Utilice un medidor de ATP para determinar el nivel de higiene en el programa de limpieza.</p>



HabiStat™ Liquid

MIXING AND DOSING INSTRUCTIONS

PRODUCTS

PROCEDURE

Water + Acepsis™ HabiStat™ Activator (A) + Base (B) = Concentrate (C)



A



B



C

(Empty Container)

- 1

STEP 1

Always mix solutions into a **clean, well labeled empty container (C)**.
- 2

STEP 2

Fill empty container (C) with proper amount of **cold, soft water**.
- 3

STEP 3

Add proper amount of **HabiStat™ Activator** to container as directed.
- 4

STEP 4

Add proper amount of **HabiStat™ Base 1000** to container as directed. Cap container immediately after mixing.
- 5

STEP 5

Allow to activate for **approximately one hour** prior to use.
- 6

STEP 6

Test solution with LaMotte ClO₂ high range **test strips** prior to use.

HABISTAT™ MIXING GUIDE

CONTAINER VOLUME PRODUCED	TARGET ClO ₂ PPM	WATER		HABISTAT™ ACTIVATOR		HABISTAT™ BASE 1000	
		OZ.	ML	OZ.	ML	OZ.	ML
1.0 GALLON / 3.78 LITERS	250	126	3720	1.0	30	1.0	30
	500	124	3660	2.0	60	2.0	60
2.5 GALLONS / 9.45 LITERS	250	315	9450	2.5	75	2.5	75
	500	310	9300	5.0	150	5.0	150
5.0 GALLONS / 18.90 LITERS	250	630	18600	5.0	150	5.0	150
	500	620	18300	10.0	300	10.0	300

1		<p>Remove</p> <p>Remove all animals from targeted cleaning area, and all organic materials from maternity pen area (bedding, manure, feed, etc.).</p>	<p>Sacar / Removar</p> <p>Saque todos los animales fuera del área que se va a limpiar, y remueva toda la materia orgánica (material de lecho, estiércol, alimento, etc.) del corral de maternidad.</p>
2		<p>Soak</p> <p>Thoroughly soak rinse targeted areas, from high to low, with warm water.</p>	<p>Remojar</p> <p>Remoje para enjuagar completamente las áreas a lavar con agua tibia.</p>
3		<p>Foam</p> <p>Apply high foaming, alkaline detergent (Chlor-A-Foam®) making sure that pH level is 10.5 – 11.0 pH, allowing to soak for 5 – 10 minutes.</p>	<p>Espumar</p> <p>Aplice el detergente alcalino clorado de alta espuma (Chlor-A-Foam®) asegurándose que el nivel de pH sea 10.5 - 11.0 pH, permita que se remoje por 5 – 10 minutos.</p>
4		<p>Scrub</p> <p>Scrub surfaces vigorously with appropriate brushes for 2 minutes.</p>	<p>Restregar</p> <p>Restriegue vigorosamente las superficies por 2 minutos con escobillas adecuadas.</p>
5		<p>Rinse</p> <p>Rinse with cold water, removing all alkaline detergent.</p>	<p>Enjuagar</p> <p>Enjuague con agua fría para remover todo el detergente alcalino.</p>
6		<p>Spray</p> <p>Spray all surfaces with diluted HabiStat® Concentrate (chlorine dioxide) at 100 PPM, spraying from highest to lowest area.</p>	<p>Rociar</p> <p>Rocíe todas las superficies con HabiStat® Concentrate (dióxido de cloro) a 100 PPM, rociando las áreas desde arriba hacia abajo.</p>
7		<p>Dry</p> <p>Allow facilities to air dry prior to use.</p>	<p>Secar</p> <p>Permita que las instalaciones se sequen al aire antes del uso.</p>
8		<p>Test/Monitor</p> <p>Use an ATP Meter to determine the level of hygiene in the cleaning program.</p>	<p>Probar/Monitorear</p> <p>Utilice un medidor de ATP para determinar el nivel de higiene en el programa de limpieza.</p>

CALF HYGIENE CLEANING PROCEDURES AND USAGE GUIDE

APPLICATION	PROCEDURES	TARGET PPM
CLEANING CALF FEEDING EQUIPMENT / UTENSILS / GENERAL SANITATION / HYGIENE PROCEDURES	<ol style="list-style-type: none"> 1. Rinse all equipment / utensils with warm water (110° F / 45° C), removing organic material before washing. 2. Soak equipment in hot water (140° F / 60° C) sink with a high foaming, chlorinated alkaline detergent (Chlor-A-Foam, making sure that pH level is 10.5 - 11.0 pH), for approximately 5 minutes. 3. Scrub vigorously with appropriate brushes for 2 minutes. 4. Rinse with cold water, removing all alkaline detergent. 5. Add HabiStat™ Concentrate (chlorine dioxide) to cold rinse water, diluting solution to 50 PPM (13 oz. / 1 gallon of water). (To make 50 PPM, mix 1 part 250 PPM to 4 parts water or 1 part 500 PPM to 9 parts water.) 6. Allow all equipment / utensils to air dry thoroughly prior to use. 	50 PPM ClO ₂
CLEANING MATERNITY / CALVING AREAS / CALF PENS / HUTCHES / FLOORS / WALLS / LIVESTOCK TRAILERS	<ol style="list-style-type: none"> 1. Remove all animals from targeted cleaning area. 2. Remove all organic materials from hutch / pen areas / trailers (bedding, manure, feed, etc.) 3. Thoroughly soak rinse targeted areas, from high to low, with warm water. 4. Apply high foaming, alkaline detergent (Chlor-A-Foam) making sure that pH level is 10.5 - 11.0 pH, allowing to soak for 5 - 10 minutes. 5. Scrub surfaces vigorously with appropriate brushes for 2 minutes. 6. Rinse with cold water, removing all alkaline detergent. 7. Spray all surfaces with diluted HabiStat™ Concentrate (chlorine dioxide) at 100 PPM, spraying from highest to lowest area. (To make 100 PPM, mix 1 part 250 PPM to 1.5 parts water or 1 part 500 PPM to 4 parts water.) 8. Allow facilities to air dry prior to use. 	100 PPM ClO ₂
ENVIRONMENTAL FOGGING / NO ANIMALS PRESENT	<ol style="list-style-type: none"> 1. Close all walls / outside ventilation to seal targeted environment. 2. Wear appropriate safety gear, including breathing apparatus, eye protection and rubber gloves when working with ClO₂ above 200 PPM. 3. Remove all animals from targeted environment prior to fogging. 4. Use approximately 1 gallon of 500 PPM HabiStat™ Concentrate (chlorine dioxide) per 2000 cubic feet. 5. Turn on fogging equipment and leave area for approximately 45 minutes. 6. Allow 60 minutes of contact time. 7. Open walls, turn on ventilation for approximately 60 minutes prior to restocking housing area with animals. 	500 PPM ClO ₂

For more information, call Acepsis™ or your local representative.



ACEPSIS™, LLC is an animal health based company that is focused on the development of state-of-the-art animal hygiene technologies. Our Company's mission is to apply innovative animal hygiene technologies into the agricultural and veterinary market sectors.

CALF FEEDING EQUIPMENT / EQUIPO DE ALIMENTACIÓN DE TERNEROS



1

Rinse

Use appropriate safety equipment, then rinse all equipment / utensils with warm water (110° F / 45° C), removing organic material before washing.

Enjuagar

Use el equipo de seguridad apropiado, luego enjuague todos los equipos y utensilios con agua tibia (110 ° F / 45 ° C) para remover la materia orgánica antes del lavado.



2

Soak

Soak equipment in hot water (140° F / 60° C) sink with a high foaming, chlorinated alkaline detergent (**Chlor-A-Foam®**) making sure the pH level is 10.5 - 11.0 pH, for approximately 5 minutes.

Remojar

Remoje por aproximadamente 5 minutos el equipo en pileta de agua caliente (140°F / 60°C) con un detergente alcalino clorado de alta espuma (**Chlor-A-Foam®**) asegurándose que el nivel de pH sea 10.5 - 11.0 p).



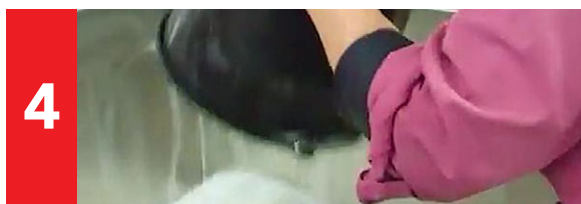
3

Scrub

Scrub vigorously with appropriate brushes for 2 minutes.

Restregar

Restriegue vigorosamente por 2 minutos con una escobilla adecuada.



4

Rinse

Rinse with cold water, removing all alkaline detergent.

Enjuagar

Enjuague con agua fría para remover todo el detergente alcalino.



5

Add

Add **HabiStat® Concentrate** (chlorine dioxide) to cold rinse water, diluting solution to 50 PPM.

Agregar

Agregue **HabiStat® Concentrate** (dióxido de cloro) al agua fría de enjuague para diluir la solución hasta 50 PPM.



6

Dry

Allow all equipment / utensils to air dry thoroughly prior to use.

Secar

Permita que el equipo y los utensilios se sequen al aire completamente antes del uso.



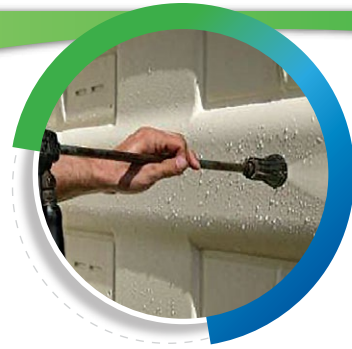
7

Test/Monitor

Use an ATP Meter to determine the level of hygiene in the cleaning program.

Probar/Monitorear

Utilice un medidor de ATP para determinar el nivel de higiene en el programa de limpieza.



HabiStat™ Liquid

MIXING AND DOSING INSTRUCTIONS

PRODUCTS

PROCEDURE

Water + Acepsis™ HabiStat™ Activator (A) + Base (B) = Concentrate (C)



A



B



C

(Empty Container)

- 1

STEP 1

Always mix solutions into a **clean, well labeled empty container (C)**.
- 2

STEP 2

Fill empty container (C) with proper amount of **cold, soft water**.
- 3

STEP 3

Add proper amount of **HabiStat™ Activator** to container as directed.
- 4

STEP 4

Add proper amount of **HabiStat™ Base 1000** to container as directed. Cap container immediately after mixing.
- 5

STEP 5

Allow to activate for **approximately one hour** prior to use.
- 6

STEP 6

Test solution with LaMotte ClO₂ high range **test strips** prior to use.

HABISTAT™ MIXING GUIDE

CONTAINER VOLUME PRODUCED	TARGET ClO ₂ PPM	WATER		HABISTAT™ ACTIVATOR		HABISTAT™ BASE 1000	
		OZ.	ML	OZ.	ML	OZ.	ML
1.0 GALLON / 3.78 LITERS	250	126	3720	1.0	30	1.0	30
	500	124	3660	2.0	60	2.0	60
2.5 GALLONS / 9.45 LITERS	250	315	9450	2.5	75	2.5	75
	500	310	9300	5.0	150	5.0	150
5.0 GALLONS / 18.90 LITERS	250	630	18600	5.0	150	5.0	150
	500	620	18300	10.0	300	10.0	300

CALF FEEDING EQUIPMENT / EQUIPO DE ALIMENTACIÓN DE TERNEROS



1

Rinse

Use appropriate safety equipment, then rinse all equipment / utensils with warm water (110° F / 45° C), removing organic material before washing.

Enjuagar

Use el equipo de seguridad apropiado, luego enjuague todos los equipos y utensilios con agua tibia (110 ° F / 45 ° C), para remover la materia orgánica antes del lavado.



2

Soak

Soak equipment in hot water (140° F / 60° C) sink with a high foaming, chlorinated alkaline detergent (**Chlor-A-Foam®**) making sure the pH level is 10.5 - 11.0 pH, for approximately 5 minutes.

Remojar

Remoje por aproximadamente 5 minutos el equipo en pileta de agua caliente (140°F / 60°C) con un detergente alcalino clorado de alta espuma (**Chlor-A-Foam®**) asegurándose que el nivel de pH sea 10.5 - 11.0 pH.



3

Scrub

Scrub vigorously with appropriate brushes for 2 minutes.

Restregar

Restriegue vigorosamente por 2 minutos con una escobilla adecuada.



4

Rinse

Rinse with cold water, removing all alkaline detergent.

Enjuagar

Enjuague con agua fría para remover todo el detergente alcalino.



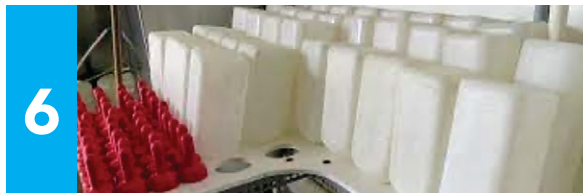
5

Add

Add **HabiStat® Concentrate** (chlorine dioxide) to cold rinse water, diluting solution to 50 PPM.

Agregar

Agregue **HabiStat® Concentrate** (dióxido de cloro) al agua fría de enjuague para diluir la solución hasta 50 PPM.



6

Dry

Allow all equipment / utensils to air dry thoroughly prior to use.

Secar

Permita que el equipo y los utensilios se sequen al aire completamente antes del uso.



7

Test/Monitor

Use an ATP Meter to determine the level of hygiene in the cleaning program.

Probar/Monitorear

Utilice un medidor de ATP para determinar el nivel de higiene en el programa de limpieza.

CALF HYGIENE CLEANING PROCEDURES AND USAGE GUIDE

APPLICATION	PROCEDURES	TARGET PPM
CLEANING CALF FEEDING EQUIPMENT / UTENSILS / GENERAL SANITATION / HYGIENE PROCEDURES	<ol style="list-style-type: none"> 1. Rinse all equipment / utensils with warm water (110° F / 45° C), removing organic material before washing. 2. Soak equipment in hot water (140° F / 60° C) sink with a high foaming, chlorinated alkaline detergent (Chlor-A-Foam, making sure that pH level is 10.5 - 11.0 pH), for approximately 5 minutes. 3. Scrub vigorously with appropriate brushes for 2 minutes. 4. Rinse with cold water, removing all alkaline detergent. 5. Add HabiStat™ Concentrate (chlorine dioxide) to cold rinse water, diluting solution to 50 PPM (13 oz. / 1 gallon of water). (To make 50 PPM, mix 1 part 250 PPM to 4 parts water or 1 part 500 PPM to 9 parts water.) 6. Allow all equipment / utensils to air dry thoroughly prior to use. 	50 PPM ClO ₂
CLEANING MATERNITY / CALVING AREAS / CALF PENS / HUTCHES / FLOORS / WALLS / LIVESTOCK TRAILERS	<ol style="list-style-type: none"> 1. Remove all animals from targeted cleaning area. 2. Remove all organic materials from hutch / pen areas / trailers (bedding, manure, feed, etc.) 3. Thoroughly soak rinse targeted areas, from high to low, with warm water. 4. Apply high foaming, alkaline detergent (Chlor-A-Foam) making sure that pH level is 10.5 - 11.0 pH, allowing to soak for 5 - 10 minutes. 5. Scrub surfaces vigorously with appropriate brushes for 2 minutes. 6. Rinse with cold water, removing all alkaline detergent. 7. Spray all surfaces with diluted HabiStat™ Concentrate (chlorine dioxide) at 100 PPM, spraying from highest to lowest area. (To make 100 PPM, mix 1 part 250 PPM to 1.5 parts water or 1 part 500 PPM to 4 parts water.) 8. Allow facilities to air dry prior to use. 	100 PPM ClO ₂
ENVIRONMENTAL FOGGING / NO ANIMALS PRESENT	<ol style="list-style-type: none"> 1. Close all walls / outside ventilation to seal targeted environment. 2. Wear appropriate safety gear, including breathing apparatus, eye protection and rubber gloves when working with ClO₂ above 200 PPM. 3. Remove all animals from targeted environment prior to fogging. 4. Use approximately 1 gallon of 500 PPM HabiStat™ Concentrate (chlorine dioxide) per 2000 cubic feet. 5. Turn on fogging equipment and leave area for approximately 45 minutes. 6. Allow 60 minutes of contact time. 7. Open walls, turn on ventilation for approximately 60 minutes prior to restocking housing area with animals. 	500 PPM ClO ₂

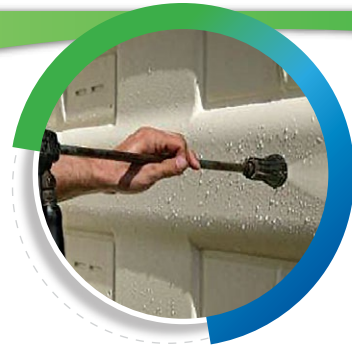
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CALF HUTCHES/CALF PENS / CABAÑAS DE TERNEROS/CORRALES DE TERNEROS

1		<p>Remove</p> <p>Remove all animals from targeted cleaning area, and all organic materials from calf housing area (bedding, manure, feed, etc.).</p>	<p>Sacar / Remover</p> <p>Saque todos los animales fuera del área que se va a limpiar, y remueva toda la materia orgánica (material de lecho, estiércol, alimento, etc.) del corral de ternero.</p>
2		<p>Soak</p> <p>Thoroughly soak rinse targeted areas, from high to low, with warm water.</p>	<p>Remojar</p> <p>Remoje para enjuagar completamente las áreas a lavar con agua tibia.</p>
3		<p>Foam</p> <p>Apply high foaming, alkaline detergent (Chlor-A-Foam[®]) making sure that pH level is 10.5 – 11.0 pH, allowing to soak for 5 – 10 minutes.</p>	<p>Espumar</p> <p>Aplique el detergente alcalino clorado de alta espuma (Chlor-A-Foam[®]) asegurándose que el nivel de pH sea 10.5 - 11.0 pH, permita que se remoje por 5 – 10 minutos.</p>
4		<p>Scrub</p> <p>Scrub surfaces vigorously with appropriate brushes for 2 minutes.</p>	<p>Restregar</p> <p>Restriegue vigorosamente las superficies por 2 minutos con escobillas adecuadas.</p>
5		<p>Rinse</p> <p>Rinse with cold water, removing all alkaline detergent.</p>	<p>Enjuagar</p> <p>Enjuague con agua fría para remover todo el detergente alcalino.</p>
6		<p>Spray</p> <p>Spray all surfaces with diluted HabiStat[®] Concentrate (chlorine dioxide) at 100 PPM, spraying from highest to lowest area.</p>	<p>Rociar</p> <p>Rocíe todas las superficies con HabiStat[®] Concentrate (dióxido de cloro) a 100 PPM, rociando las áreas desde arriba hacia abajo.</p>
7		<p>Dry</p> <p>Allow facilities to air dry prior to use.</p>	<p>Secar</p> <p>Permita que las instalaciones se sequen al aire antes del uso.</p>
8		<p>Test/Monitor</p> <p>Use an ATP Meter to determine the level of hygiene in the cleaning program.</p>	<p>Probar/Monitorear</p> <p>Utilice un medidor de ATP para determinar el nivel de higiene en el programa de limpieza.</p>



HabiStat™ Liquid

MIXING AND DOSING INSTRUCTIONS

PRODUCTS

PROCEDURE

Water + Acepsis™ HabiStat™ Activator (A) + Base (B) = Concentrate (C)



A



B



C

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Always mix solutions into a **clean, well labeled empty container (C)**.
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Fill empty container (C) with proper amount of **cold, soft water**.
- 3

STEP 3

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Add proper amount of **HabiStat™ Base 1000** to container as directed. Cap container immediately after mixing.
- 5

STEP 5

Allow to activate for **approximately one hour** prior to use.
- 6

STEP 6

Test solution with LaMotte ClO₂ high range **test strips** prior to use.

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CALF HYGIENE CLEANING PROCEDURES AND USAGE GUIDE

APPLICATION	PROCEDURES	TARGET PPM
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CALF FEEDING EQUIPMENT / EQUIPO DE ALIMENTACIÓN DE TERNEROS



1

Rinse

Use appropriate safety equipment, then rinse all equipment / utensils with warm water (110° F / 45° C), removing organic material before washing.

Enjuagar

Use el equipo de seguridad apropiado, luego enjuague todos los equipos y utensilios con agua tibia (110 ° F / 45 ° C), para remover la materia orgánica antes del lavado.



2

Soak

Soak equipment in hot water (140° F / 60° C) sink with a high foaming, chlorinated alkaline detergent (**Chlor-A-Foam**®) making sure the pH level is 10.5 - 11.0 pH, for approximately 5 minutes.

Remojar

Remoje por aproximadamente 5 minutos el equipo en pileta de agua caliente (140°F / 60°C) con un detergente alcalino clorado de alta espuma (**Chlor-A-Foam**®) asegurándose que el nivel de pH sea 10.5 - 11.0 pH.



3

Scrub

Scrub vigorously with appropriate brushes for 2 minutes.

Restregar

Restriegue vigorosamente por 2 minutos con una escobilla adecuada.



4

Rinse

Rinse with cold water, removing all alkaline detergent.

Enjuagar

Enjuague con agua fría para remover todo el detergente alcalino.



5

Add

Add **HabiStat**® Concentrate (chlorine dioxide) to cold rinse water, diluting solution to 50 PPM.

Agregar

Agregue **HabiStat**® Concentrate (dióxido de cloro) al agua fría de enjuague para diluir la solución hasta 50 PPM.



6

Dry

Allow all equipment / utensils to air dry thoroughly prior to use.

Secar

Permita que el equipo y los utensilios se sequen al aire completamente antes del uso.



7

Test/Monitor

Use an ATP Meter to determine the level of hygiene in the cleaning program.

Probar/Monitorear

Utilice un medidor de ATP para determinar el nivel de higiene en el programa de limpieza.

Chlor-A-Foam™

THE ULTIMATE DETERGENT FACILITY HYGIENE TECHNOLOGY



Improving Animal Wellness Through Optimized Facility Hygiene

FACILITY HYGIENE BEST PRACTICES

Looking clean is no longer an adequate practice. Optimal hygiene requires the proper steps to provide the highest level of protection against the spread of disease-causing organisms.

Acepsis™ CHLOR-A-FOAM™ is an ultra-concentrated alkaline foam cleaning detergent, designed for use in the most challenging manual cleaning applications. Using an 11 - 13 pH, the detergent contains powerful facility cleaning and hygiene agents. **CHLOR-A-FOAM™** attacks the toughest soil conditions, lifting the soil from a specified surface. A key element in the removal of dangerous biofilms from the targeted surfaces.



BIOSECURITY Biosecurity is a set of practices employed to prevent the importation, and / or exportation of infectious organisms into a herd or flock, and their transmission between animals. As animal group sizes increase and as animals are placed in more intensive housing, it is easier for infectious diseases to enter and spread throughout the animal population.



ANIMAL WELLNESS Animal wellness is a function of many environmental variables, including physical surroundings. Components to be taken into account include temperature, humidity, light, air quality, space (including complexity of space), nutritional factors, facility hygiene and water hygiene.



FACILITY HYGIENE BEST PRACTICES Optimal hygiene requires the proper steps to provide the highest level of protection against the spread of disease-causing organisms. Key “Best Hygiene Practices” require:

- The development of a facility specific hygiene program
- Addressing cleaning and disinfection practices and procedures
- Monitoring facility “animal wellness” results, documenting facility morbidity and mortality levels

HabiShield™

ANIMAL HYGIENE DRYING POWDER

with Chlorine Dioxide Technology



1		<p>Remove Remove all old bedding between births.</p>	<p>Retirar Retire toda la paja / la arena vieja entre los nacimientos.</p>
2		<p>Sprinkle Sprinkle HabiShield™ drying powder onto floor prior to installation of new bedding. Spread maternity pens with clean, dry bedding.</p>	<p>Espolvorear Espolvoree el polvo de secado HabiShield™ en el piso antes de instalar el material orgánico nuevo. Esparce el material orgánico limpio y seco en el corral de maternidad.</p>
3		<p>Sprinkle Wearing rubber gloves, sprinkle HabiShield™ on newborn calf's back.</p>	<p>Espolvorear Usando guantes de goma, espolvoree HabiShield™ en la espalda del ternero recién nacido.</p>
4		<p>Rub Rub HabiShield™ into calf's hair with a clean towel until dry and fluffy.</p>	<p>Restregar Frote el HabiShield™ en el pelaje del ternero con una toalla limpia hasta que esté seco y esponjoso.</p>
5		<p>Sprinkle Sprinkle HabiShield™ into gloved hand and rub into the calf's umbilical area. Apply twice (within two hours and following day).</p>	<p>Espolvorear Espolvoree HabiShield™ en mano enguantada y frote en el área umbilical de la pantorrilla. Aplicar dos veces (dentro de las dos horas y al día siguiente).</p>

HabiShield™

WHY HabiShield™?

- Drying helps a newborn to better regulate its body temperature. Otherwise, heat is removed from the animal as the water evaporates.
- This leaves the newborn highly susceptible to chilling, and wastes the newborn's energy.
- Young animals have little subcutaneous fat, which leaves them with minimal insulation.
- Newborns with poor respiration also struggle more to regulate their temperature.



PART #	DESCRIPTION
ACEZ160	HABISHIELD™ SHAKER – 6.5 lbs. (2.9 kg)
ACEZ035	HABISHIELD™ POWDER – 35 lbs. (15.8 kg)
ACEZ090	HABISHIELD™ POWDER – 90 lbs. (40.8 kg)

For more information, call Acepsis™ or your local representative. [f](#) [in](#) [X](#) [▶](#)

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APPENDIX B— CHLORINE DIOXIDE OVERVIEW

- **CHLORINE DIOXIDE BASICS**
- **CHLORINE DIOXIDE VS. HYDROGEN PEROXIDE**
- **USES OF CHLORINE DIOXIDE**

- **ORP METER**
- **ATP METER**



WHY CHLORINE DIOXIDE?

Chlorine dioxide is well known as the most effective agent for a wide range of hygiene uses. The Acepsis™ products have the ability to be activated almost instantly when mixed with local water, to provide a powerful chlorine dioxide- based solution.

TOTAL HYGIENE PROGRAM

Acepsis™ products focus on the use of chlorine dioxide technologies as a primary step within a total hygiene program.

Chlorine dioxide is considered one of the most powerful disinfectants available, but more importantly it can be used safely across the wide range of animal agriculture applications:

- Water hygiene treatment
- Facility hygiene treatment
- Animal hygiene treatment

WHAT ARE ITS PROPERTIES?

Chlorine dioxide is a powerful oxidizing agent, and oxidizing agents are the most prominent disinfectants used in the animal agriculture hygiene processes (chlorine, sodium hypochlorite, iodophors (iodines), hydrogen peroxide, peracetic acid and ozone). Chlorine dioxide is a gas, that when created is more soluble and much more efficient in water than chlorine / sodium hypochlorite. Chlorine dioxide does not hydrolyze (break apart) in water like hydrogen peroxide and sodium hypochlorite.

ECOLOGICALLY FRIENDLY

Unlike chlorine / sodium hypochlorite, chlorine dioxide does not react with naturally occurring organic materials, that form trihalomethanes (THMs) and bromates. Chlorine dioxide aids in reducing the formation of total trihalomethanes (TTHM's – are disinfection byproducts that form when chlorine compounds that are used to disinfect water react with other naturally occurring chemicals in the water.). Acepsis chlorine dioxide formulations have been approved for use by NSF International and Organic Certifiers.

CHLORINE DIOXIDE COMPARISON BENEFITS

Chlorine Dioxide (ClO ₂)	vs.	Hydrogen Peroxide (H ₂ O ₂)
● Extremely high oxidation and germicidal efficacy values. Wide spectrum / quick kill		● Moderate oxidation and disinfection values
● Superior hygiene for animal, facility and water applications		● Limited use for individual application
● Rapid killing action across spectrum of organisms (seconds)		● Low to moderate killing actions (minutes to not effective)
● Excellent biocidal values across a broad spectrum of disease-causing organisms		● Limited biocidal values and efficacies
● Effective in low concentrations and is extremely soluble in water		● Breaks apart and disassociates itself (hydrolyzes) when added to water
● Effective in wide solution pH range		● pH range specific. Highly acidic
● New, high efficiency, easy to implement water injection system. Superior ROI ¹		● Low efficiency water dosing systems
● EPA approved technology for water disinfection systems		● Not approved by EPA as a stand-alone water disinfection technology
● Environmentally friendly. Unlike sodium hypochlorite (NaClO) does not produce ecotoxic byproducts such as TMH, HAA or chloro-phenols		● Environmentally friendly. 100% biodegradable. Hydrolyzes into oxygen and H ₂ O when added to water

¹Acepsis, LLC is proud to provide the new AquaSoar™ Activation System that delivers the highest yields and efficiency in the activation and dosing of the AquaSoar™ product. Higher yields, higher efficiency, quantifiable results, increased ROI.

● = Superior ● = Moderate ● = Inferior / Lacking

CHLORINE DIOXIDE USES / APPLICATIONS

- Disinfection and for public crises
- Water treatment plants and farm water sources
- Water recycling
- Disinfection of equipment
 - Pre-clean Surfactant
 - Succeeding Rinse
- Health Care Industries
- Air disinfection and decontamination of buildings
- Mold eradication
- COVID-19: EPA lists chlorine dioxide as an agent against coronavirus
- Fumigant treatment for sanitizing fruits and vegetables
- Disinfection of poultry by spray or immersion after slaughter
- Oxidant: destroys the phenols in waste water streams and for odor control





The ATP Meter

THE PERFECT TOOL TO HELP DETERMINE THE LEVEL OF PATHOGEN BUILDUPS

ASSESSING THE CLEANLINESS LEVEL

How to determine the level of hygiene in a cleaning program, and whether the program itself is adequate? Studies show that up to 34% of surfaces do not get cleaned. Using the proper tool to give the accurate levels of pathogen presence can result in time, animal and cost savings.

THE ATP METER

The ATP test is a process of rapidly measuring actively growing microorganisms through detection of adenosine triphosphate, or ATP. ATP is a molecule found in and around living cells, and as such it gives a direct measure of biological concentration and health. The amount of light produced is directly proportional to the amount of ATP present in the sample.

HOW IT WORKS

The ATP meter measures contaminants at the location and displays results numerically in Relative Light Units (RLU) by using bio-luminescence technology. The contamination results are easy to understand. The higher the RLU, the higher the reading, the more contamination present.

IMPROVED HYGIENE PRACTICES

The ATP meter is extremely beneficial when setting up and monitoring individual hygiene programs. Assessing the cleanliness of a surface immediately after cleaning ensures contamination has been removed; the amount of ATP present should be significantly reduced. This system can help farm quality, prevent cross-contamination, and enable immediate corrective action. Using the ATP meter along with swabs gives nearly immediate indications of whether your hygiene routines are working or not.

CFU : RLU Conversion					
CFU / ml or swab*		E.coli	Coliform	Enterobacteriaceae**	Total
<10	∞	<2	<2	NA	<10
<20	∞	<4	<4	NA	<20
<50	∞	<7	<7	<10	<50
<100	∞	<12	<12	<20	<100
<200	∞	<20	<20	<40	<200
<500	∞	<35	<35	<100	<500
<1,000	∞	<60	<60	<200	<1,000
<5,000	∞	<180	<180	<1,000	<5,000
<10,000	∞	<300	<300	TNTC	TNTC



The ORP Meter

THE PERFECT TOOL TO EVALUATE THE EFFECTIVENESS OF A WATER TREATMENT PROGRAM

Tools, Standard Operating Procedures and Guidelines to effect a more complete biosecurity level

ORP: MEASURING DISINFECTION POWER

ORP (Oxidation Reduction Potential) measures the oxidizing power of a solution, providing the actual sanitizing strength of the solution being tested. Simply counting the PPM (parts per million) of a disinfectant present is misleading due to the changes of chemistry when a solution is diluted with water, or the hydrolysis of the disinfectant when mixed in water. An ORP meter measures a dilution strength in millivolts (mV). The higher the ORP value the greater the oxidizing action and the shorter the microbial kill time in the solution.

MANY ADVANTAGES

ORP offers many advantages to “real-time” monitoring and recording of water disinfection potential, a critical water quality parameter. Hand-held devices are affordable and are an essential backup for cross-referencing the operation of an inline ORP sensor, as are the more traditional dose-related test kits.

A primary advantage of using ORP is that it provides the operator with a rapid and single-value assessment of the disinfection potential of a solution. Research has shown that at an ORP value of 650 to 700 mV, free-floating decay, and spoilage bacteria, as well as pathogenic bacteria such as *E. coli* O157:H7 or *Salmonella* species, are killed within 30 seconds.**

Measurement of Oxidizing Agent ORP Values In Pathogen Disinfection*

OXIDIZING AGENT | OXIDIZING AGENT ORP VALUE RANGE (mV)

CHLORINE DIOXIDE (ClO ₂)		600 → 1000 MV
OZONE* (O ₂)		700 → 1000 MV
IODOPHORS (I ₂)		400 → 600 MV
HYDROGEN PEROXIDE		300 → 500 MV
SODIUM HYPOCHLORITE		250 → 500 MV



ORP Values In Pathogen Disinfection**

PATHOGEN SURVIVAL IN SECONDS (S) OR HOURS (H) AT ORP LEVELS (MV)

Pathogens	< 500 ORP (mV)	500 - 600	600 - 700	700+
E. COLI (O157:H7)	> 300 S	< 60 S	< 10 S	< 1 S
SALMONELLA SPP.	> 300 S	> 300 S	< 20 S	< 1 S
LISTERIA MONOCYTOGENES	> 300 S	> 300 S	< 30 S	< 1 S
THERMO-TOLERANT COLIFORM	> 48 H	> 48 H	< 30 S	< 1 S

*Ozone is greatly influenced by the water quality and ozonation system.

**Oxidation Reduction Potential (ORP) for Disinfection Monitoring, Control and Documentation; University of California, Trevor Suslow, Department of Vegetable Crops, University of California - Davis

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ACEPSIS™, LLC is an animal health based company that is focused on the development of state-of-the-art animal hygiene technologies. Our Company's mission is to apply innovative animal hygiene technologies into the agricultural and veterinary market sectors.



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