Welcome

JAX

Behnke Lubricants

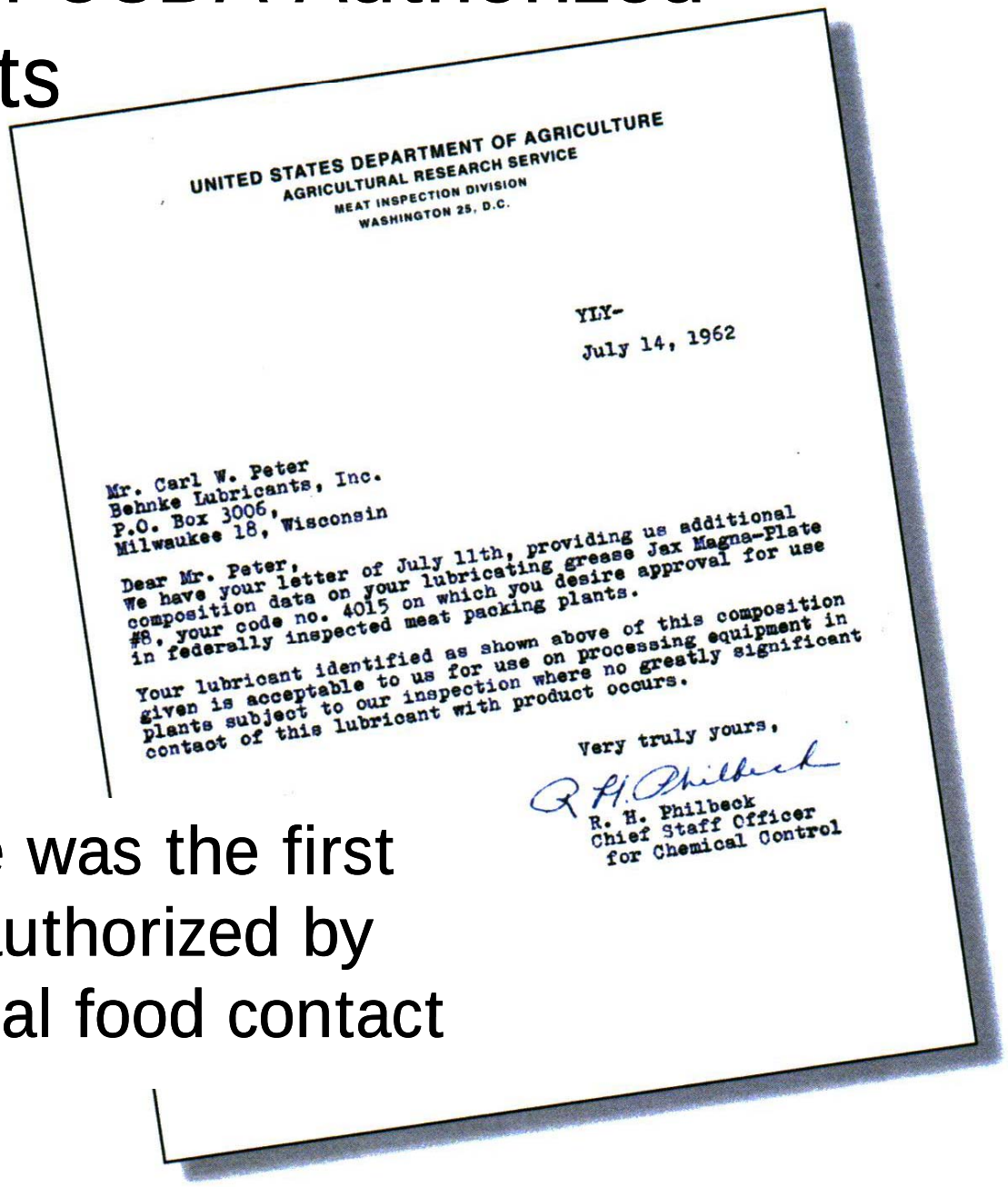
Industry Expertise

Over 130 USDA/NSF
Authorized Products

Industry Expertise

- Serving the Food Processing Market for over 40 Years

Pioneers in USDA Authorized Lubricants



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
MEAT INSPECTION DIVISION
WASHINGTON 25, D.C.

YLY-

July 14, 1962

Mr. Carl W. Peter
Behnke Lubricants, Inc.
P.O. Box 3006,
Milwaukee 18, Wisconsin

Dear Mr. Peter,

We have your letter of July 11th, providing us additional composition data on your lubricating grease Jax Magna-Plate #8, your code no. 4015 on which you desire approval for use in federally inspected meat packing plants.

Your lubricant identified as shown above of this composition given is acceptable to us for use on processing equipment in plants subject to our inspection where no greatly significant contact of this lubricant with product occurs.

Very truly yours,

R. H. Philbeck

R. H. Philbeck
Chief Staff Officer
for Chemical Control

Magna-Plate 8 grease was the first machinery lubricant authorized by the USDA for incidental food contact in 1962.

Industry Expertise

Synthetic Compressor Lubricants

- Syncomp – P
  - (PAO/Ester-Based)
- Syncomp – D
  - (Diester-Based)
- Flow-Guard Synthetic Fluids
  - (PAO-Based, USDA/NSF H1 Authorized)

Industry Expertise

Synthetic Gear Lubricants

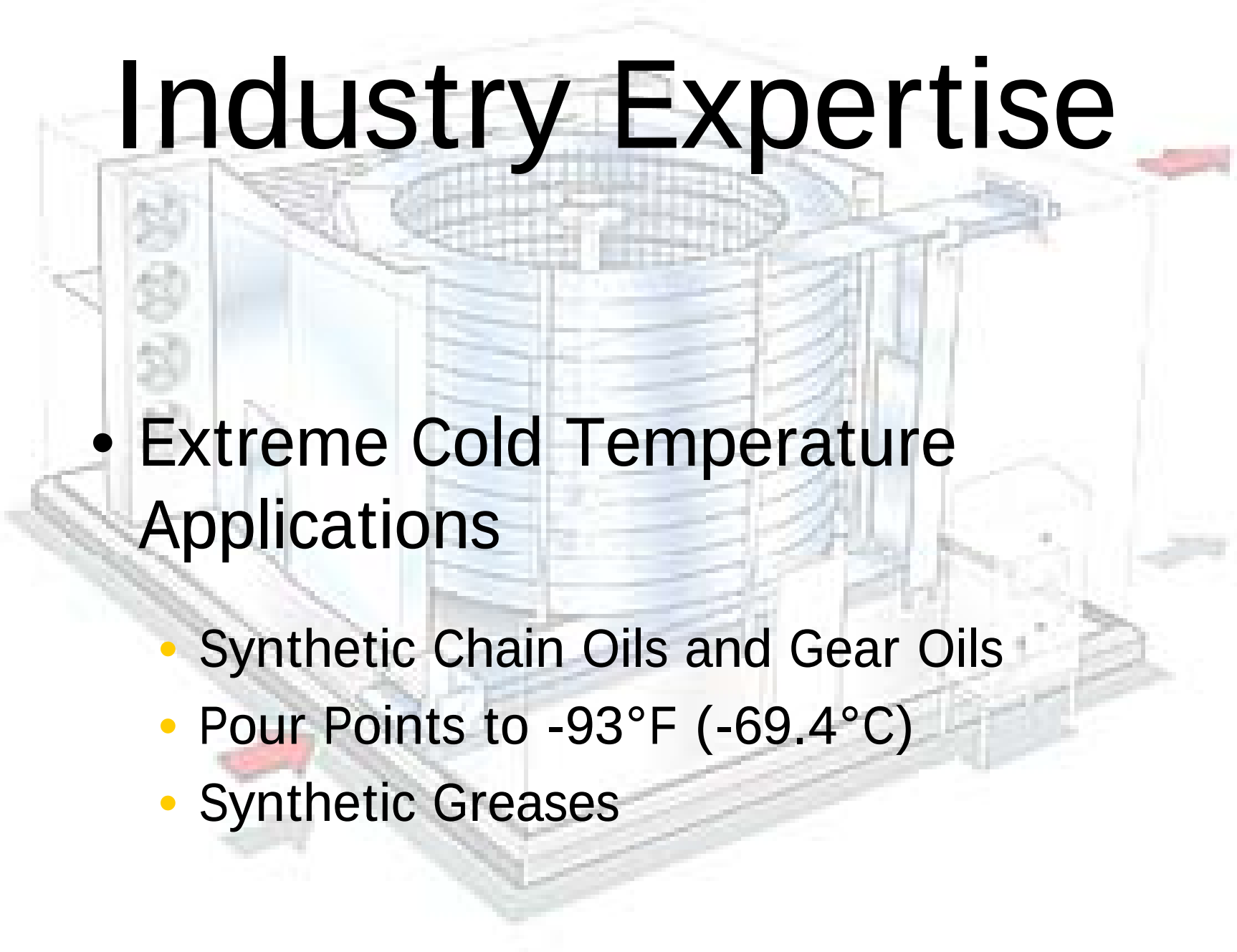
- Syngear Industrial Series
- Synax EP Series
- Flow-Guard Synthetic FG
  - USDA/NSF H1 Authorized
- Magna-Plate 85W140FG, 250FG
  - PAG-Based, USDA/NSF H1 Authorized

Industry Expertise

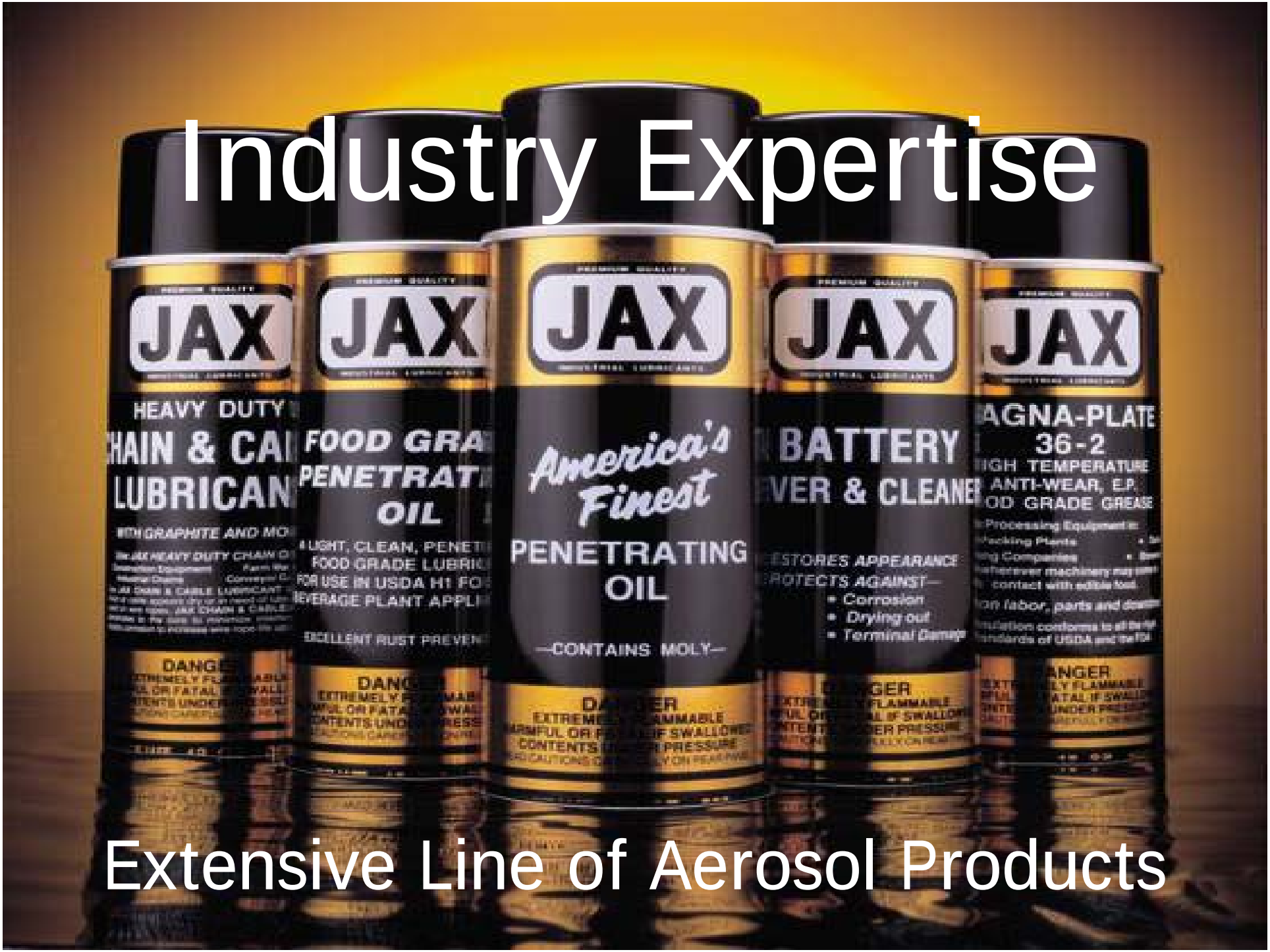
High Temperature Synthetic Chain Oils Used Extensively in

- Wood Products Manufacturing
- Fiberglass Manufacturing
- Baking Industry

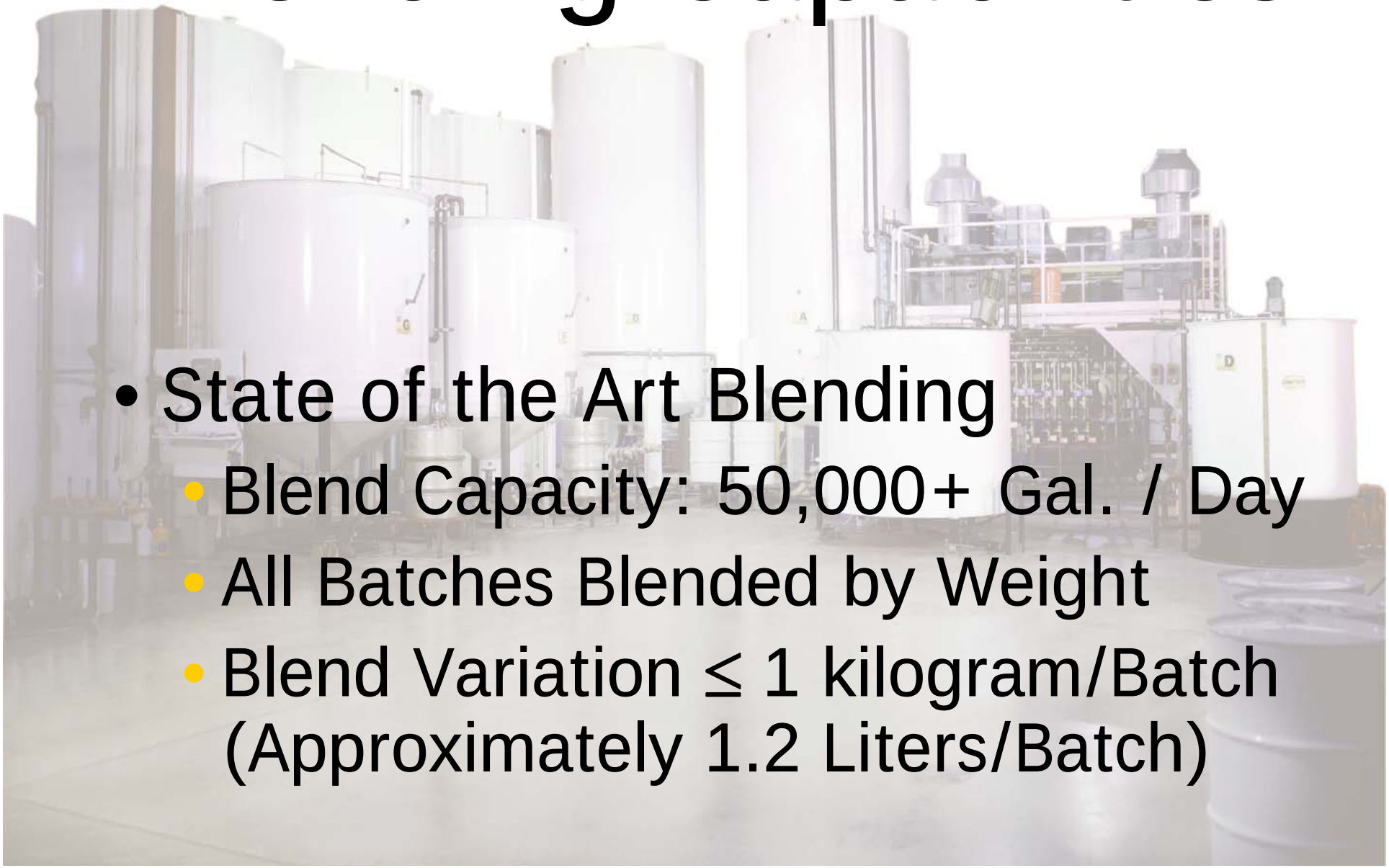
Industry Expertise



- Extreme Cold Temperature Applications
  - Synthetic Chain Oils and Gear Oils
  - Pour Points to -93°F (-69.4°C)
  - Synthetic Greases


Industry Expertise
JAX
HEAVY DUTY
LUBRICAN
FOOD GRA
PENETRATI
OIL
America's Finest
PENETRATING
OIL
—CONTAINS MOLY—
BATTERY
AGNA-PLATE
36-2
Extensive Line of Aerosol Products

Blending Capabilities



- State of the Art Blending
  - Blend Capacity: 50,000+ Gal. / Day
  - All Batches Blended by Weight
  - Blend Variation ≤ 1 kilogram/Batch (Approximately 1.2 Liters/Batch)

Quality Protection
All Products Utilize Dedicated Transfer Lines and Storage Containers

Customer Support

Extensive Laboratory Facilities

Used Oil Analysis

Proactive Maintenance Support

Food Grade Lubricants

What's the Difference Between Food Grade Lubricants and Non-Food Grade Lubricants in

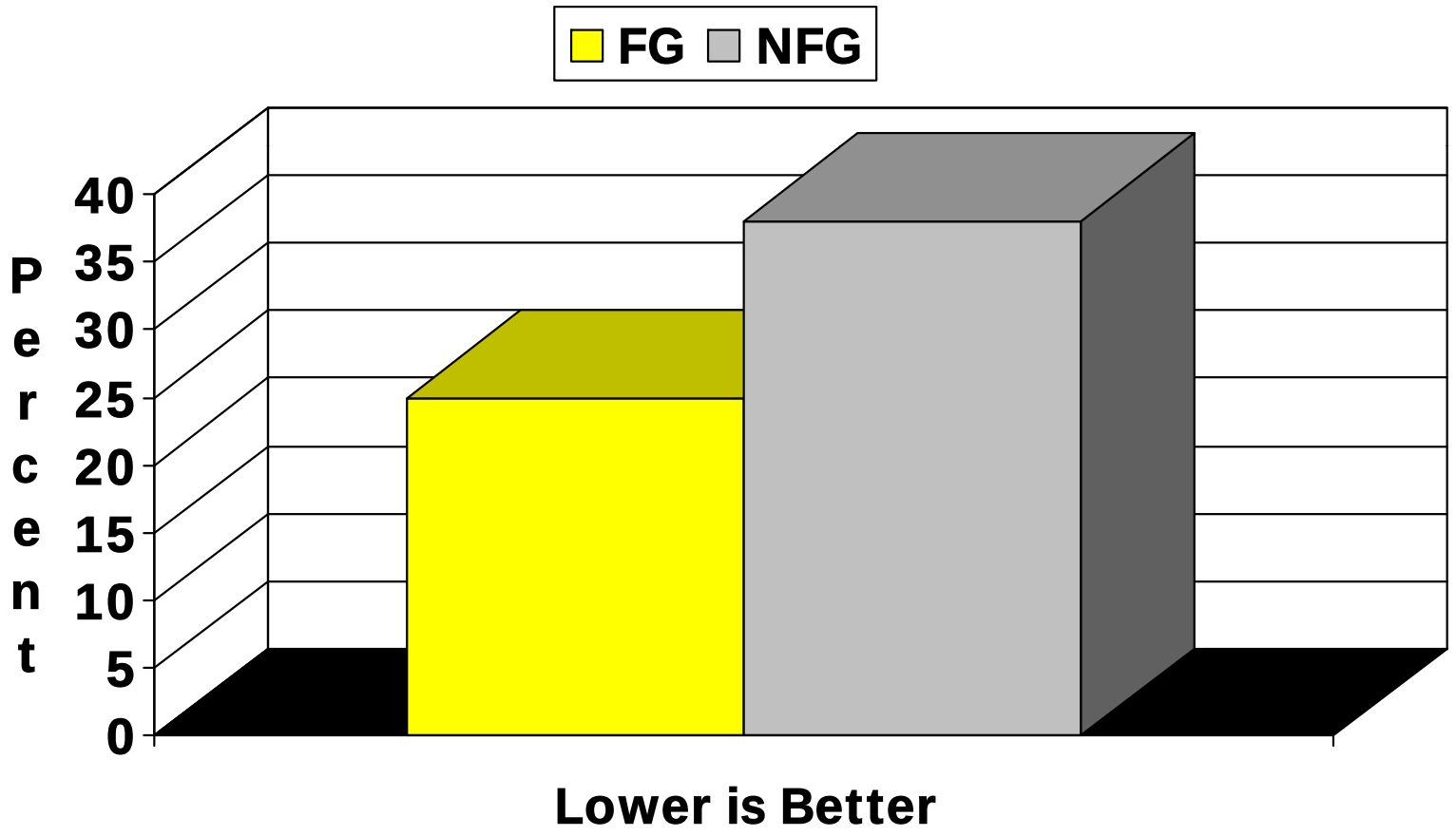
- Thermal and Oxidative Stability
- Wear Protection
- Corrosion (Rust) Protection
- Water Resistance
- Lubrication Intervals

Food Grade Lubricants

Thermal Stability

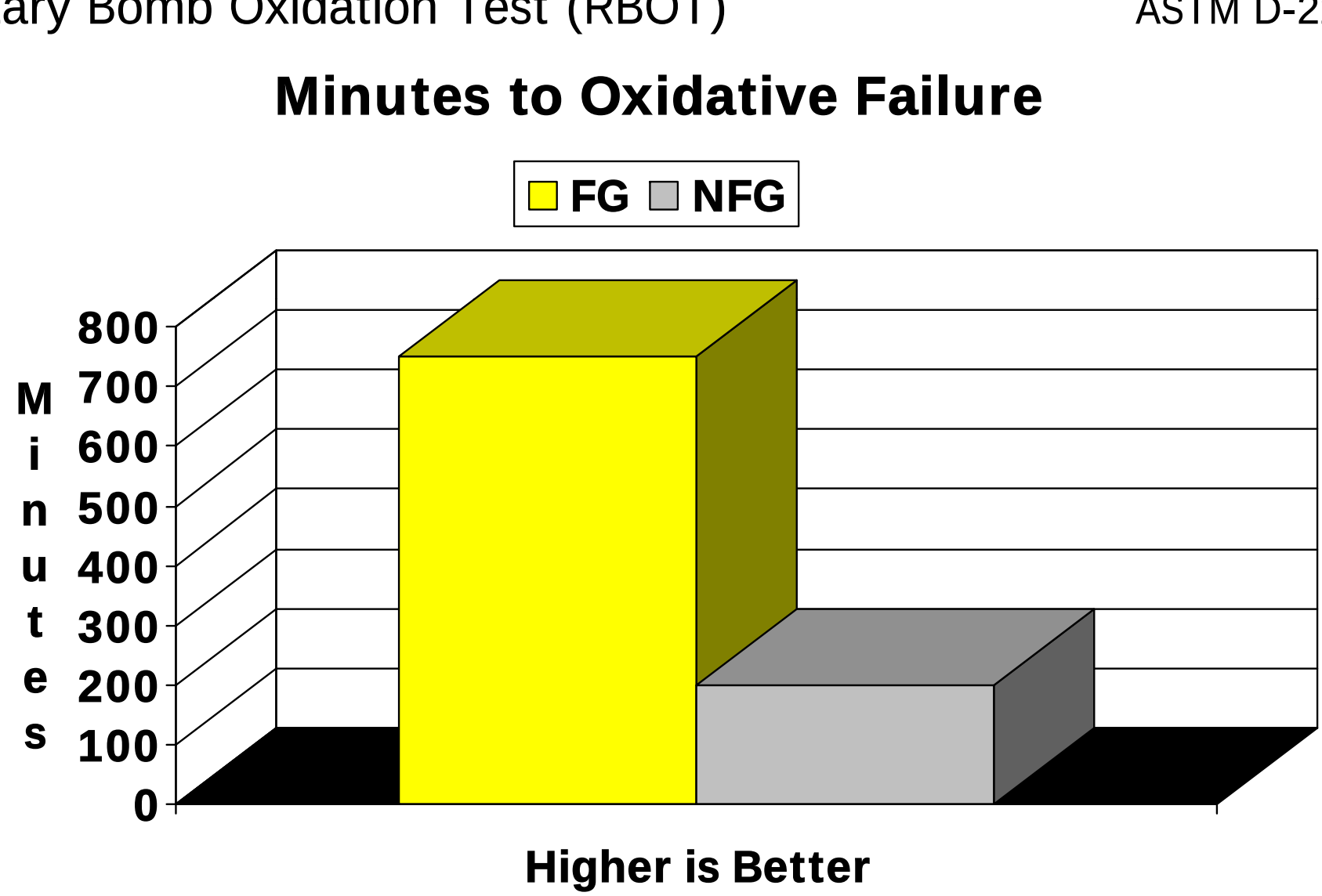
Viscosity Increase

ASTM D-2893 Mod.



Food Grade Lubricants

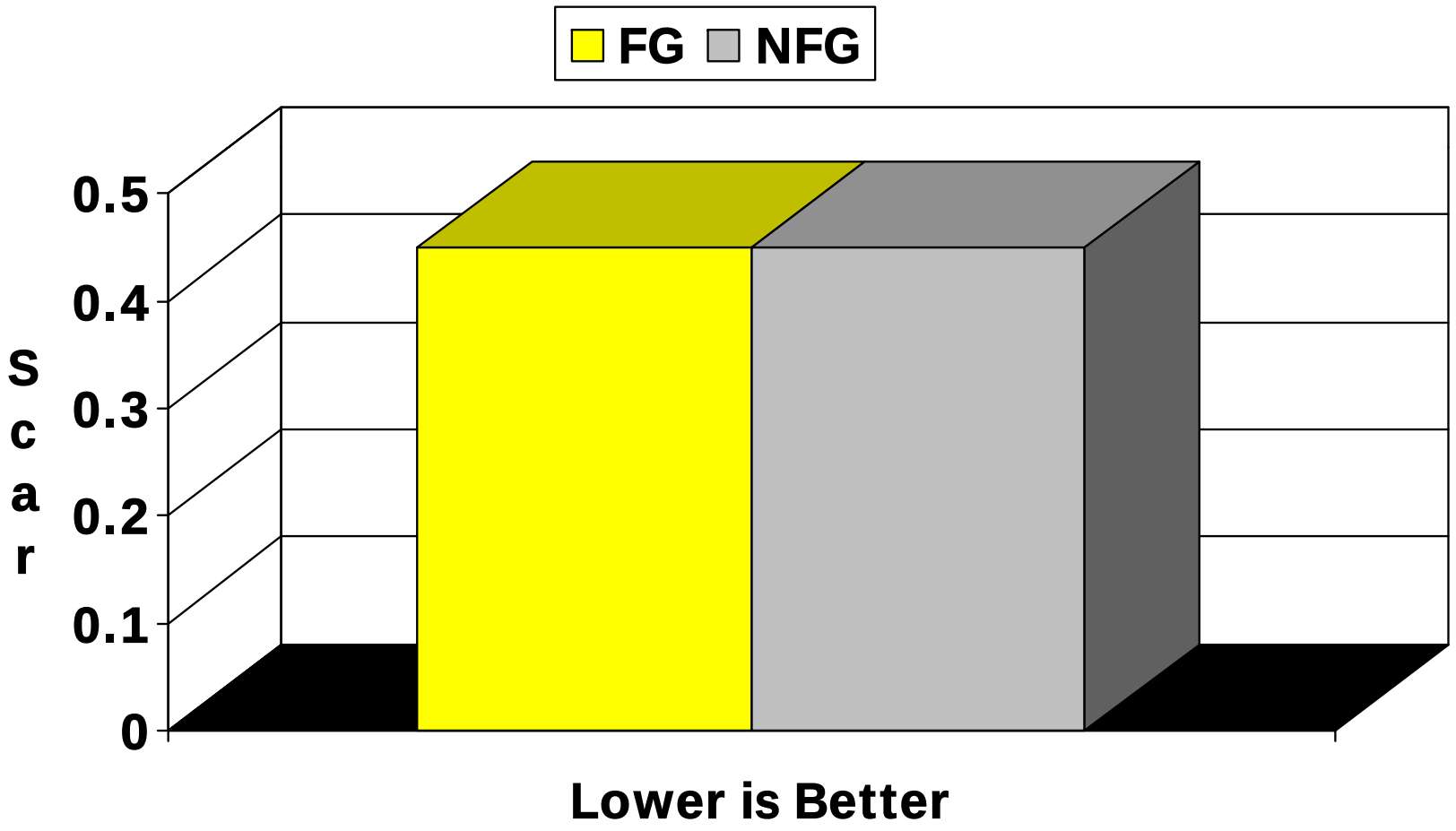
Rotary Bomb Oxidation Test (RBOT) ASTM D-2272



Food Grade Lubricants

Shell Four-Ball Wear Test

ASTM D-4172



Food Grade Lubricants

How do they Compare in Other Areas?

- Corrosion (Rust) Protection
  - Comparable (Additive Driven)
- Water Resistance
  - Comparable (Varies Based on Base Fluid and Additive Selection)
- Lubrication Intervals
  - Superior (Higher Quality of Food Grade Base Oils Provides Superior Longevity)

Halo-Guard FG Greases

- Proprietary Calcium Sulfonate Thickener
- Unequaled EP Performance in a USDA/NSF H1 Grease
  - 60 lb. Timken Load

FOOD GRADE, HIGH-TEMP, CORROSION CONTROL GREASE WITH E.P. AND ANTIWEAR

HALO-GUARD FG GREASES

FG

APPLICATION

JAX Halo-Guard FG is a revolutionary food-grade grease manufactured with an advanced, proprietary calcium sulfonate complex thickener. This newly enhanced thickener technology provides exceptional mechanical stability, very high load-carrying ability and remarkable rust and corrosion control. In addition, JAX Halo-Guard FG has excellent water resistance and outstanding high-temperature performance characteristics. All of these remarkable features combine to make JAX Halo-Guard FG a true high-performance, plant-wide food-grade grease.

The outstanding performance characteristics of JAX Halo-Guard FG can benefit numerous food and beverage plant applications such as can fillers and seamers, meat saws and knives, conveyor bearings, salt-dispensing valves, cookers and sterilizers, aseptic processing equipment and all food or beverage equipment subject to water and corrosive washdown. As a multipurpose plant-wide grease, JAX Halo-Guard FG can extend food-grade integrity to shop and plant equipment including fork trucks, conveyors, pumps, dryers, filters, presses, mills and packaging machines.

PERFORMANCE

The mechanical stability of JAX Halo-Guard FG is outstanding. Worked stability testing shows little change in Cone Penetration (D 217) or consistency after 100,000 strokes. There is no evidence of shear breakdown in the Roll Stability Test (D 1831), even in an extended high-temperature, modified version to increase the test's severity. In addition, extensive grease studies using mixtures of popular food-grade thickener technology have shown JAX Halo-Guard FG possesses very good compatibility with the vast majority of the most popular food-grade greases on the market.

JAX Halo-Guard FG has excellent E.P. and antiwear performance characteristics. This is illustrated with Timken OK Values (D 2509) of 60 pounds or greater, and 4 Ball EP (D 2596) LWI results of over 60 kgf with a weld point of 500 kgf. 4 Ball Wear (D 2266) performance is equally impressive with typical wear scars of less than 0.40 mm.

Rust and corrosion resistance is a particular bright spot in the performance of JAX Halo-Guard FG. It easily passes the standard Corrosion Preventive Properties Test (D 1743). A severe, Salt Fog Test (B 117) yields passing performance in excess of 300 hours.

The thermal and oxidative stability of JAX Halo-Guard FG means that excellent performance in most high-temperature applications can be achieved without another specialized grease. A dropping point of 572°F (300°C) means that JAX Halo-Guard FG is the highest temperature-capable, multipurpose food-grade grease on the market. In addition, sulfonate greases return to their original grease structure when cooled after reaching temperatures approaching their drop point, unlike lithium complex or polyurea greases. High-Temperature Bearing Life Test (D 3527) yields results of 120 hours, easily exceeding the NLGI GC/LB requirements of 80 hours. Bomb Oxidation results of 9 psi drop after 1000 hours means that JAX Halo-Guard FG will outperform nearly all industrial nonfood-grade greases in high-temperature oxidation stability, a remarkable achievement for a food-grade, NSF H1 grease!

Water resistance is of particular importance in food-grade grease applications. Few industrial applications are subject to the severe process and sanitation water and chemical contamination inherent in modern food and beverage plants. JAX Halo-Guard FG is one of the most water-resistant food-grade greases on the market with Water Washout (D 1264) results of 3.5% weight loss.

FOOD PLANT-WIDE GREASE SUPERSTAR

JAX Halo-Guard FG Series greases can satisfy the lubricant demands in nearly any food plant machinery application. This makes JAX Halo-Guard FG the ideal grease for general plant-wide grease lubrication. Superior water resistance, excellent compatibility with other greases, outstanding corrosion control, and excellent antiwear and E.P. performance help simplify grease inventory and provide the ultimate in food-grade grease performance.

Performance Features

- Outstanding Rust & Corrosion Control
- Unsurpassed E.P. and Antiwear Properties
- Very Good Compatibility with Most Greases
- Excellent High-Temperature Oxidation Stability
- High-Temperature Performance
- Excellent Pumpability Characteristics
- Water Washout and Chemical Resistance

Performance Benefits

- Rust Preventative Performance in a Food-Grade Grease
- Greatly Extended Life for Lubricated Parts
- Reduced Grease Incompatibility Concerns
- Greatly Extended Grease Intervals
- Eliminates Specialty High-Temp Greases
- Suitable for Automated Greasing Systems
- Protection of Parts from Process Water and Chemicals

JAX

America's Finest Industrial Lubricants

Halo-Guard Machinery Applications

- Blending
- Baking
- Frying
- Slicing
- Bottling
- Chilling
- Packaging
- Sterilizing
- Homogenizing
- Stirring
- Cutting
- Canning
- Mixing
- Cooking

Current FG Grease Technology

- Anhydrous Calcium
- Aluminum Complex
- Silica Thickened
- Bentonite (Clay) Thickened

- Base Oil – USP White Mineral Oil

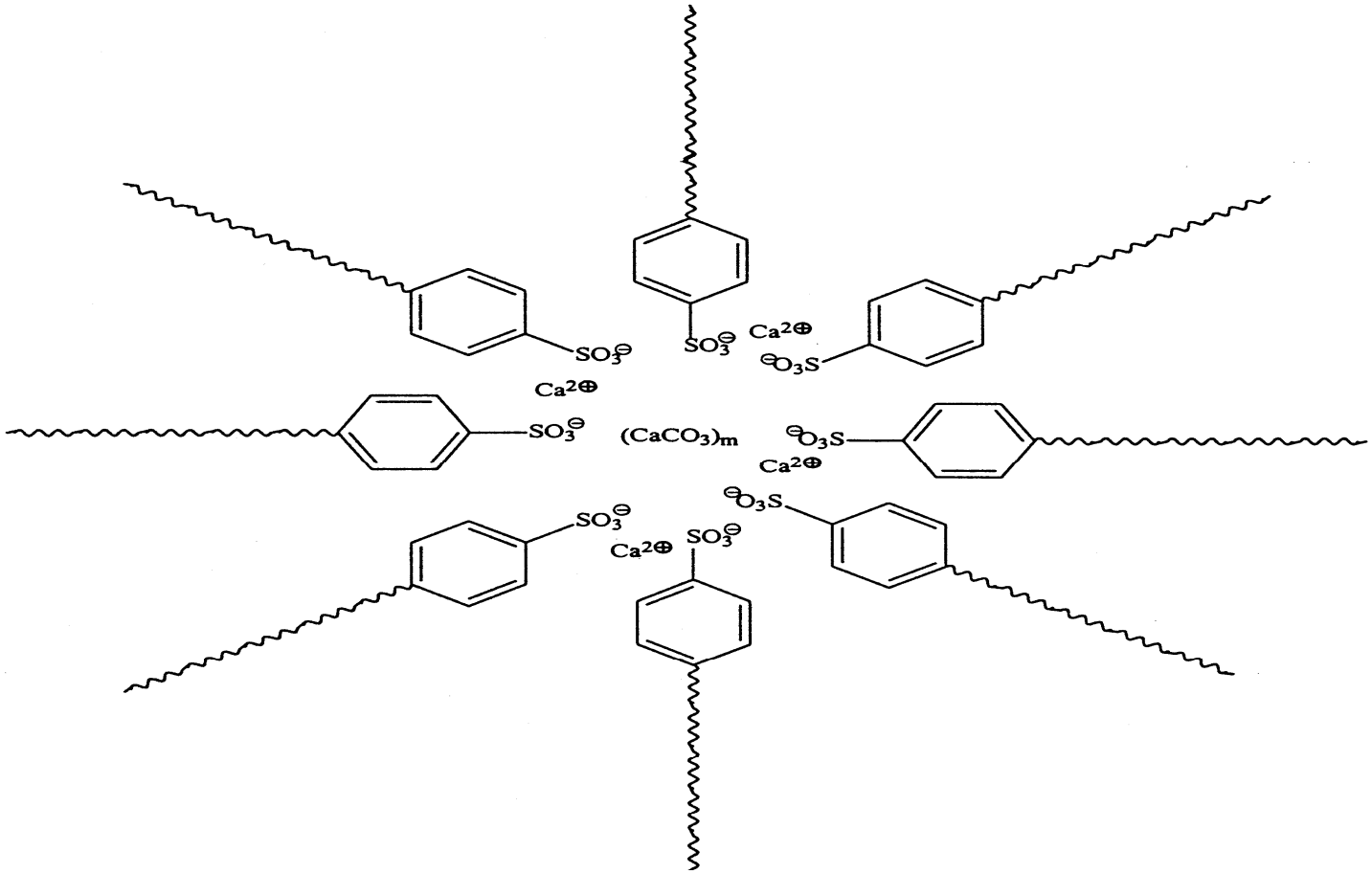
Approval versus Performance

Halo-Guard FG

Next Generation Food Machinery Grease

- USDA/NSF H1 Authorized
- Water Resistance
- Corrosion Resistance
- Antiwear and Unequaled EP
- High Temperature Life
- Reduced Bleed and Leakage

Overbased Calcium Sulfonate



Inherent Properties of the Thickener

Dropping Point

Mechanical Stability

Corrosion Protection

Extreme Pressure

Antiwear

First Calcium Sulfonate Complex Grease H1 Approved

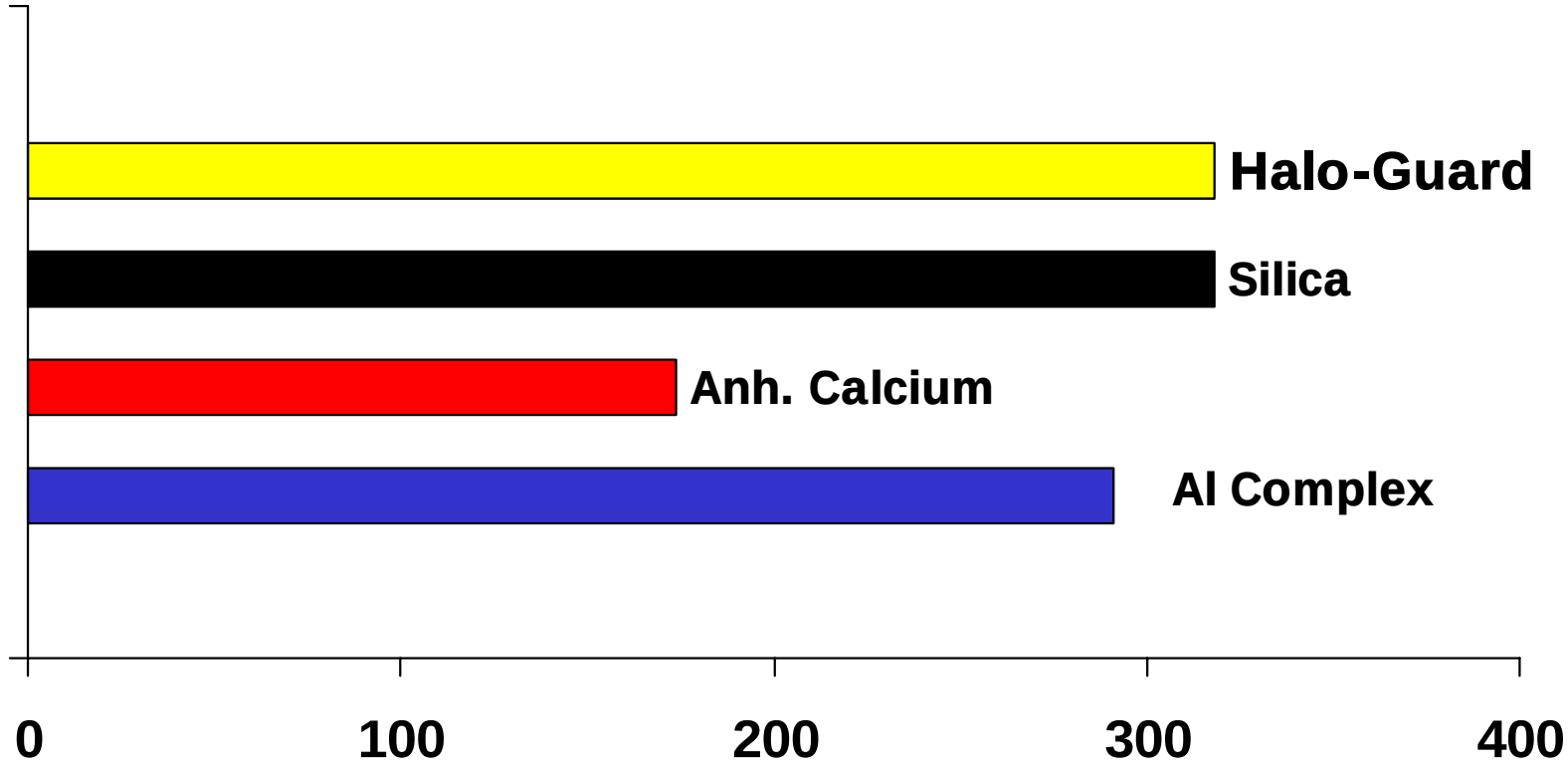
NSF®

REGISTERED

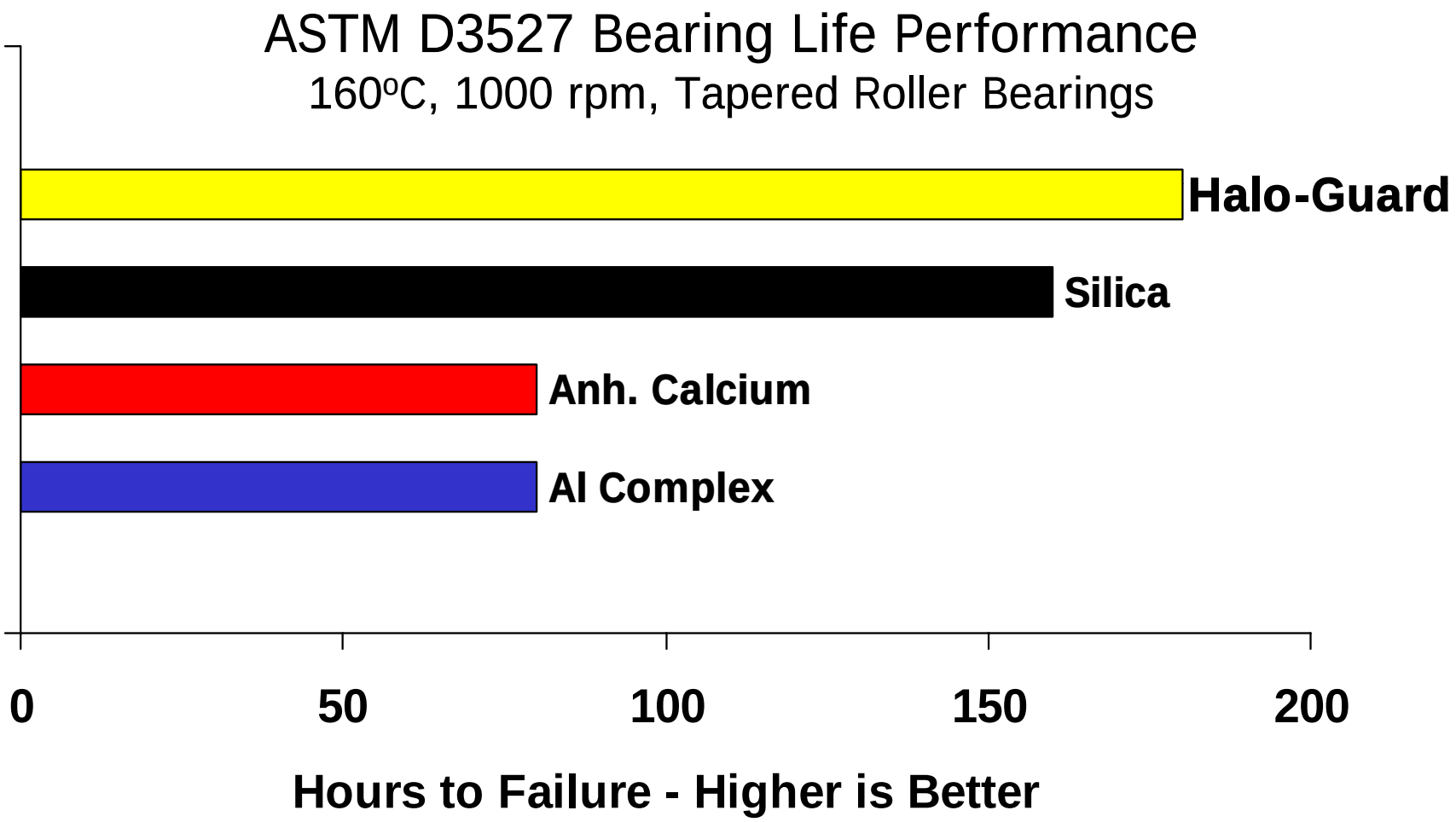
Reg. 126100

Dropping Point

ASTM D2265 Dropping Point Test

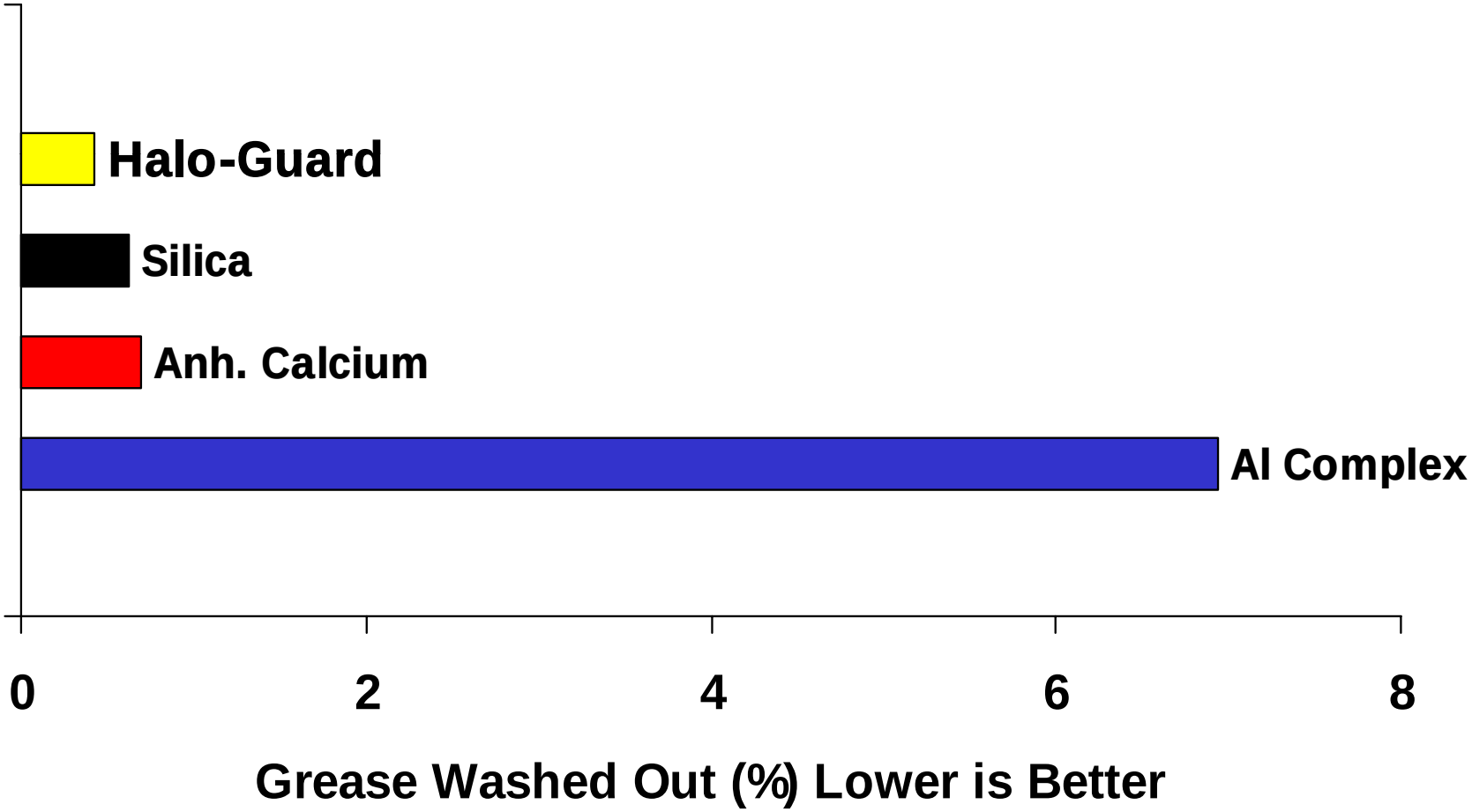


High Temperature Bearing Life



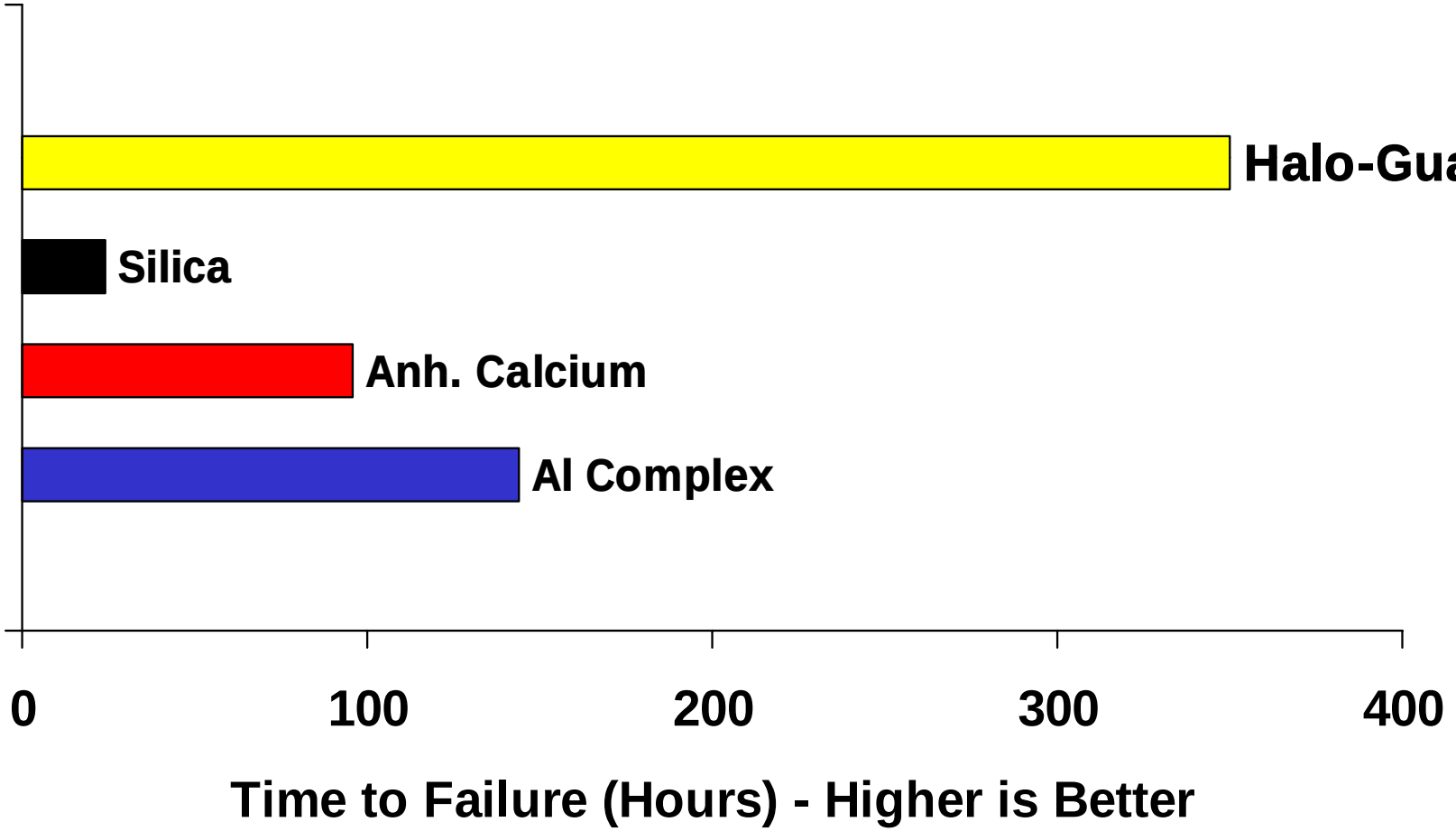
Water Resistance

ASTM D1264 Water Washout @ 80ºC



Corrosion Resistance

ASTM B117 Salt Fog Test

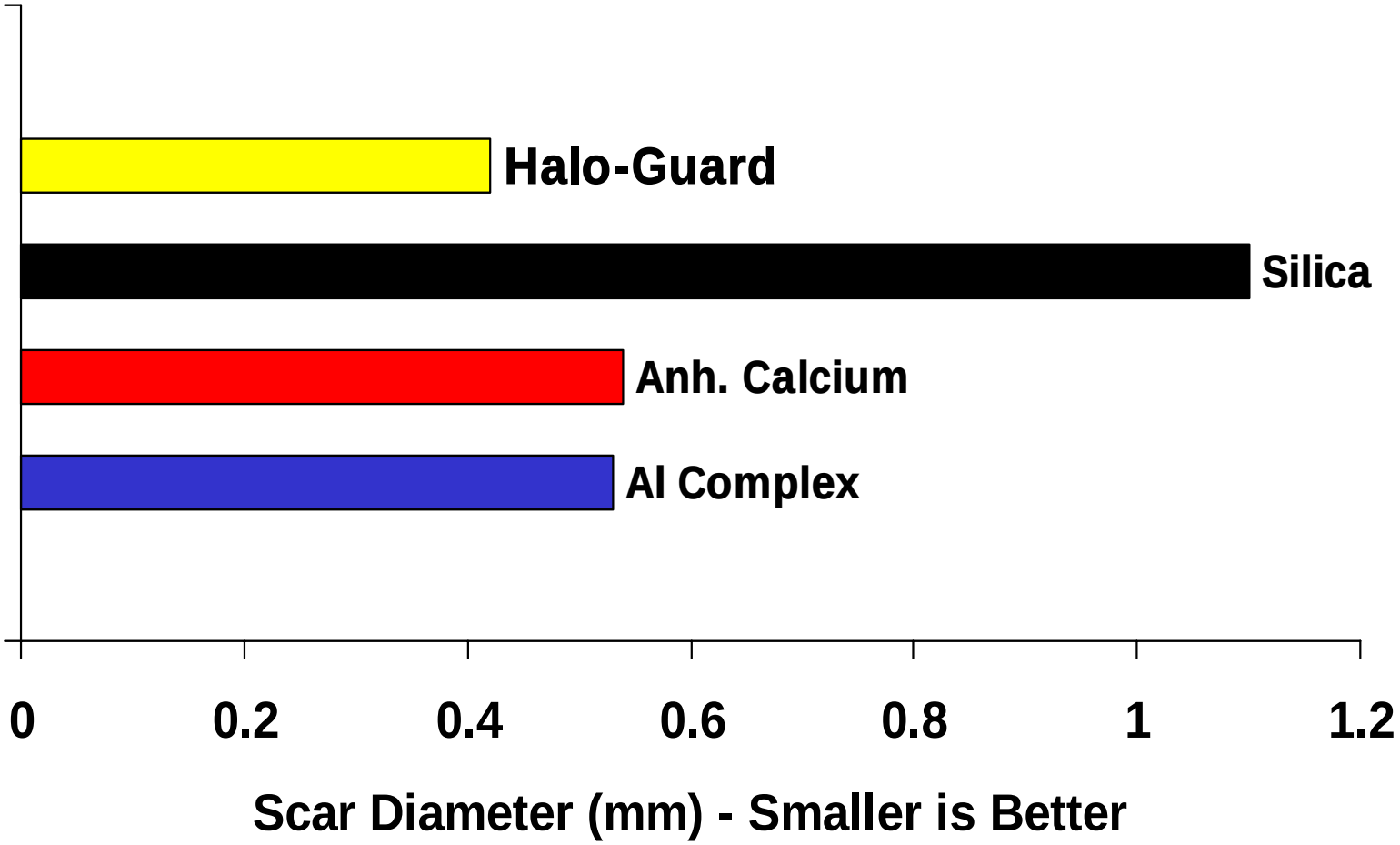


Salt Fog Results After 350 Hours

Halo-Guard FG2 Halo-Guard FG LT Aluminum Complex

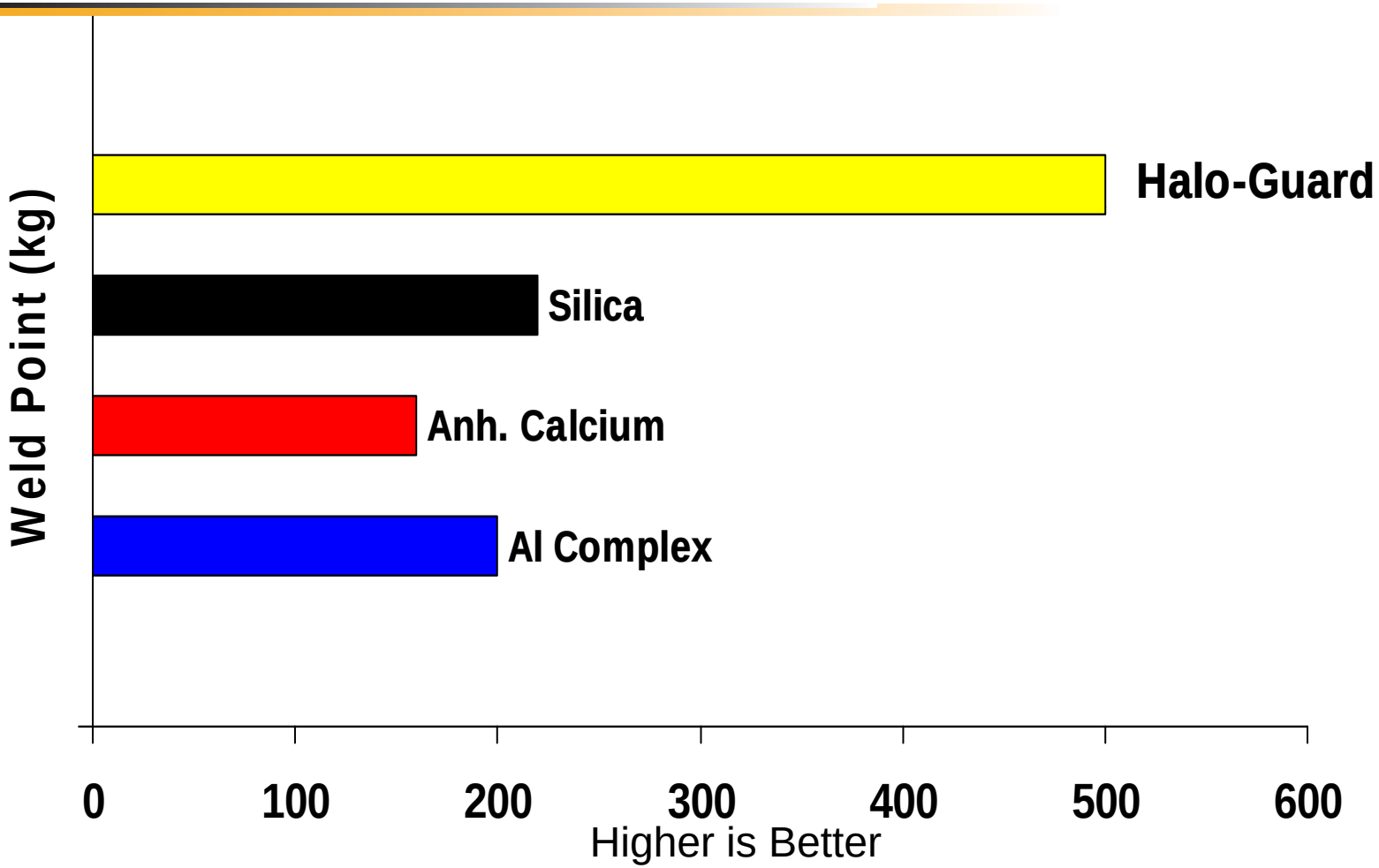
Antiwear Properties

ASTM D2266 4-Ball Wear Test
(40 kg, 1200 rpm, 75°C, 60 minutes)



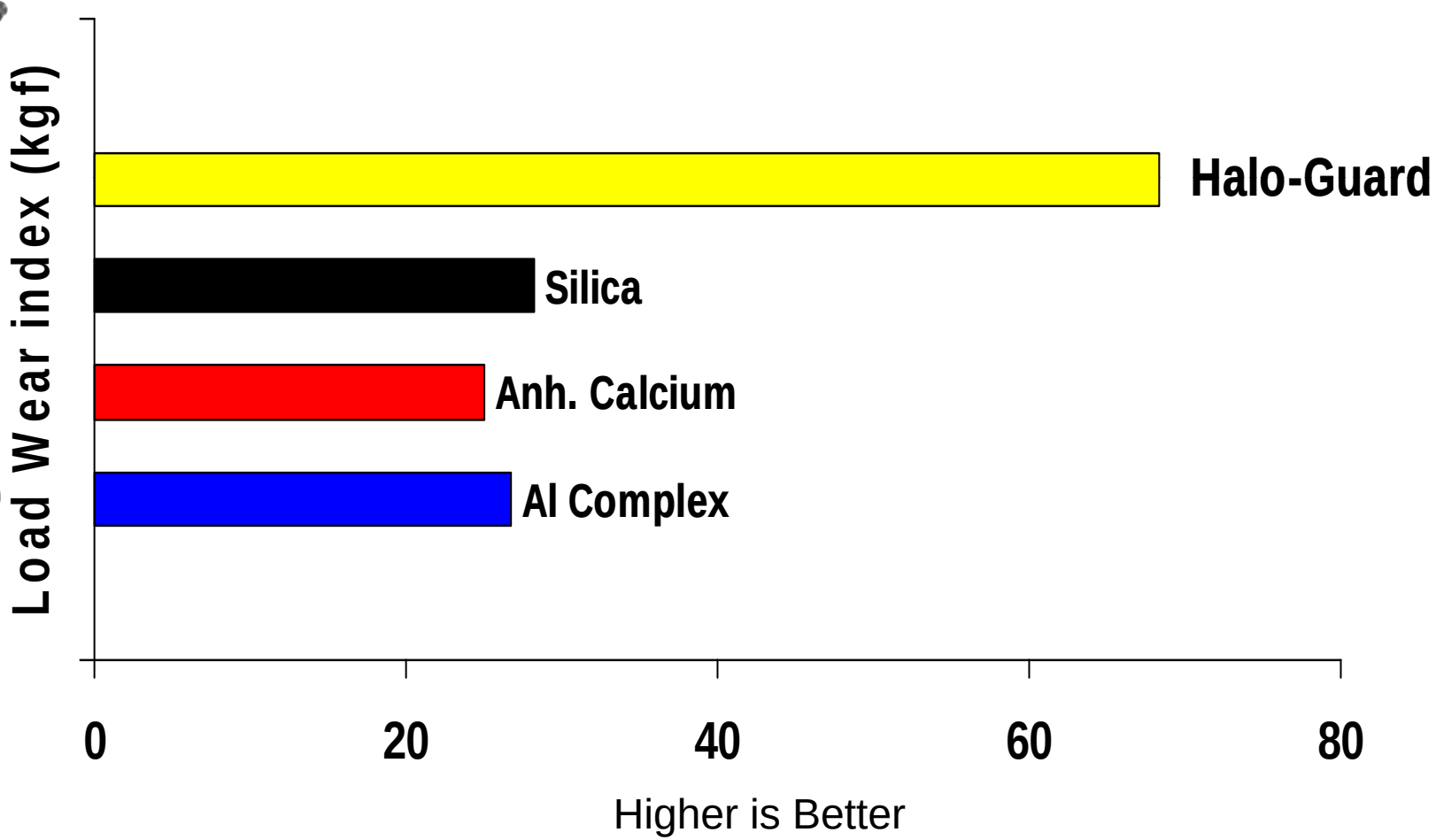
Extreme Pressure Properties

ASTM D2596 4-Ball EP Test



Extreme Pressure Properties

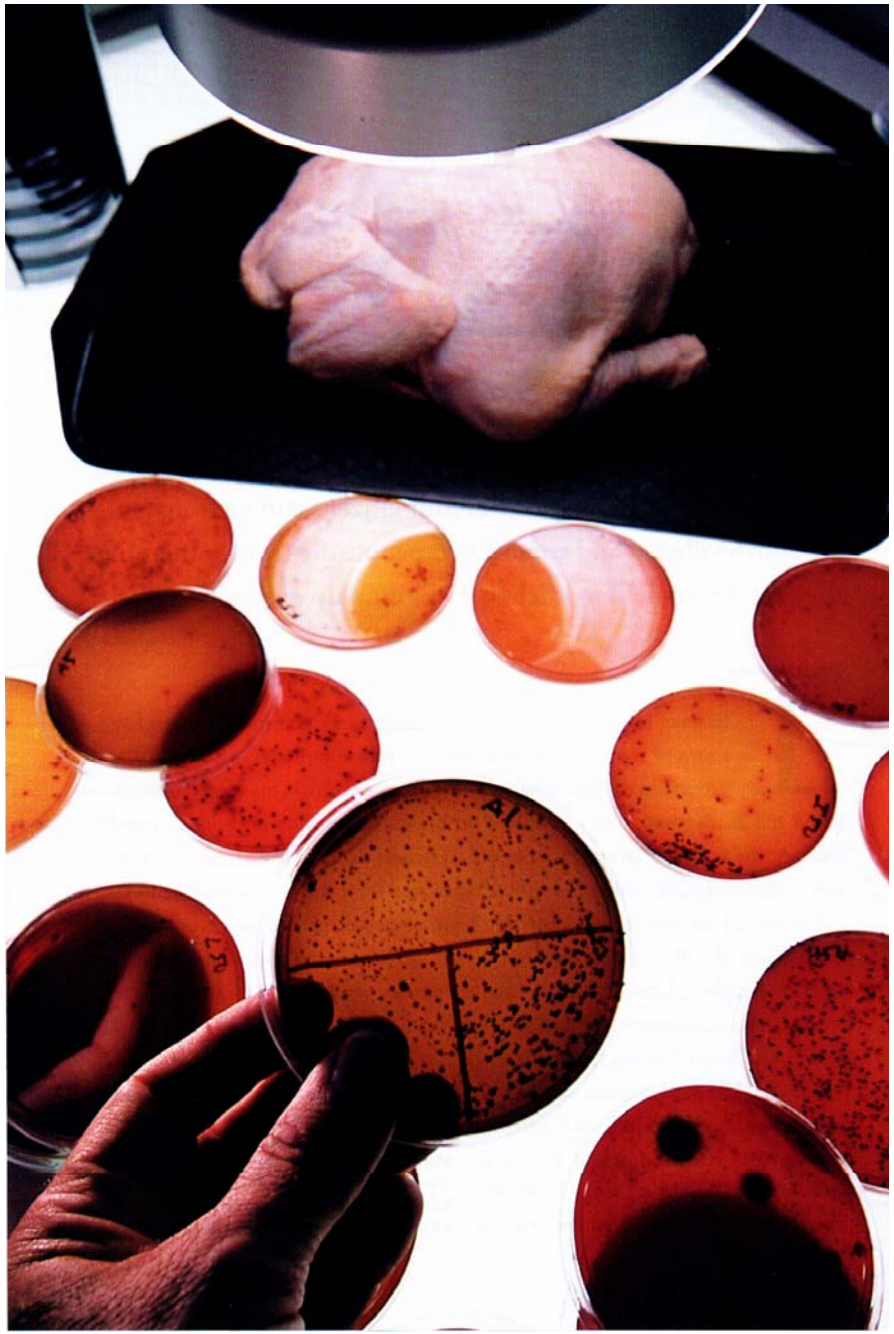
ASTM D2596 4-Ball EP Test



How Safe?

The United States boasts the safest food in the world. Maybe so, maybe not. Each year one in four citizens suffers from a foodborne illness, and some 5,000 people die from something they ate. From field to kitchen, risks crop up everywhere.

- According to the CDC
  - 76 million people suffer food borne disease annually
  - 325,000 are hospitalized
  - 5000 Die…

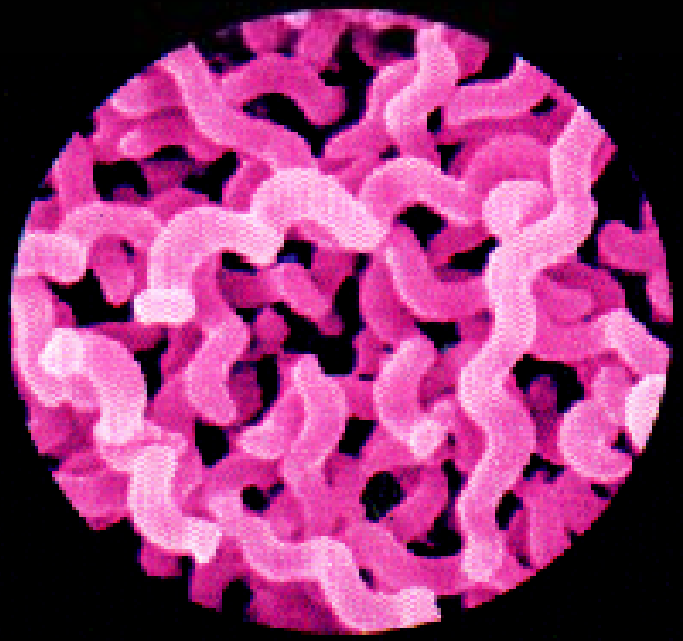


Farm to Fork

USUALLY WE CAN'T SEE, SMELL, OR TASTE THE BACTERIA THAT MAKE US SICK.

Whether people are getting sicker from food today than they were 50 years ago is a matter of debate. What is different are the pathogens. Advances in processing and sanitation in the developed world have diminished foodborne threats such as cholera and botulism, but new hazards come with imported foods, changes in the scale of food production, and the decline in home cooking.

Common Bacteria



Campylobacter jejuni

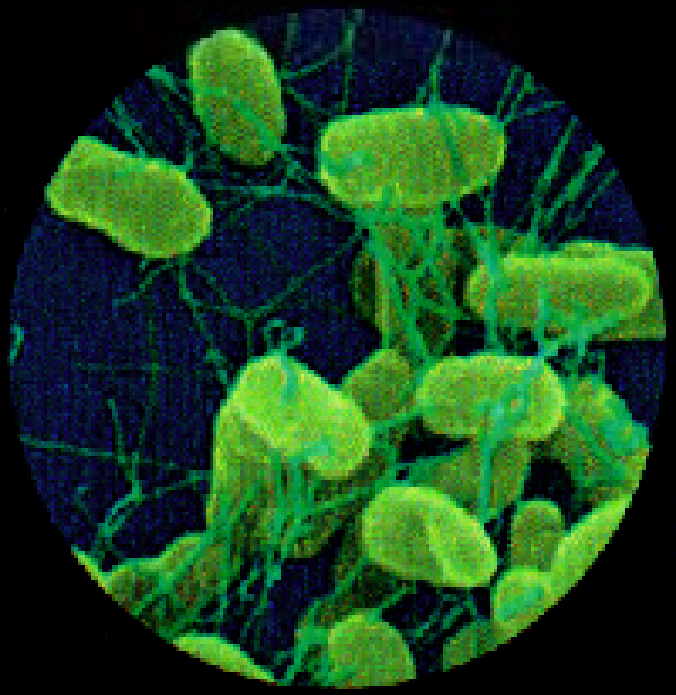
Common in poultry flocks, this bacterium has become the leading cause of bacterial foodborne disease in the U.S. Exposure to a small number of microbes can cause illness. Most infected persons recover within a week.

Common Bacteria

Escherichia coli O157:H7

First identified as a cause of disease in 1982, this pathogen produces a powerful toxin that causes bloody diarrhea and occasionally kidney failure. Infections generally result from eating undercooked ground beef.

Common Bacteria



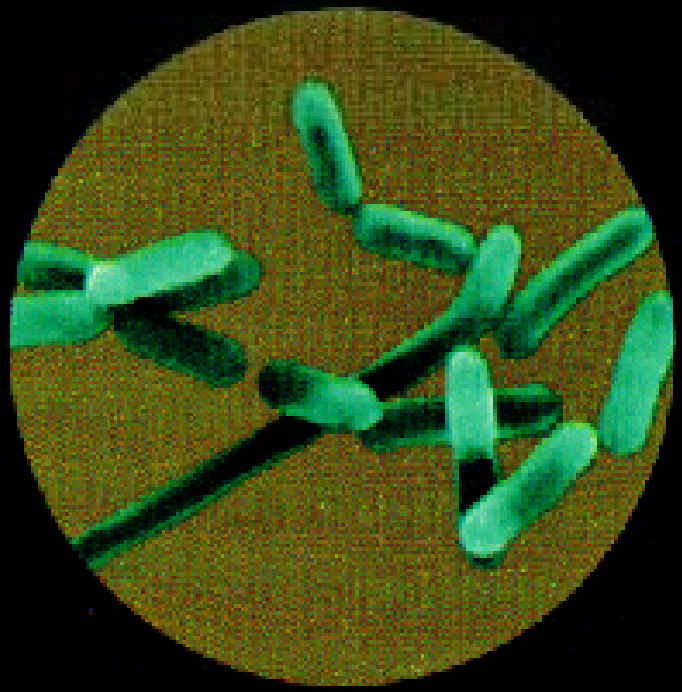
Salmonella enteritidis

Almost any food tainted by infected animal feces will carry *Salmonella* bacteria. Chicken and eggs are especially high-risk carriers. Infections have leveled off, yet an emerging strain shows high rates of drug resistance.

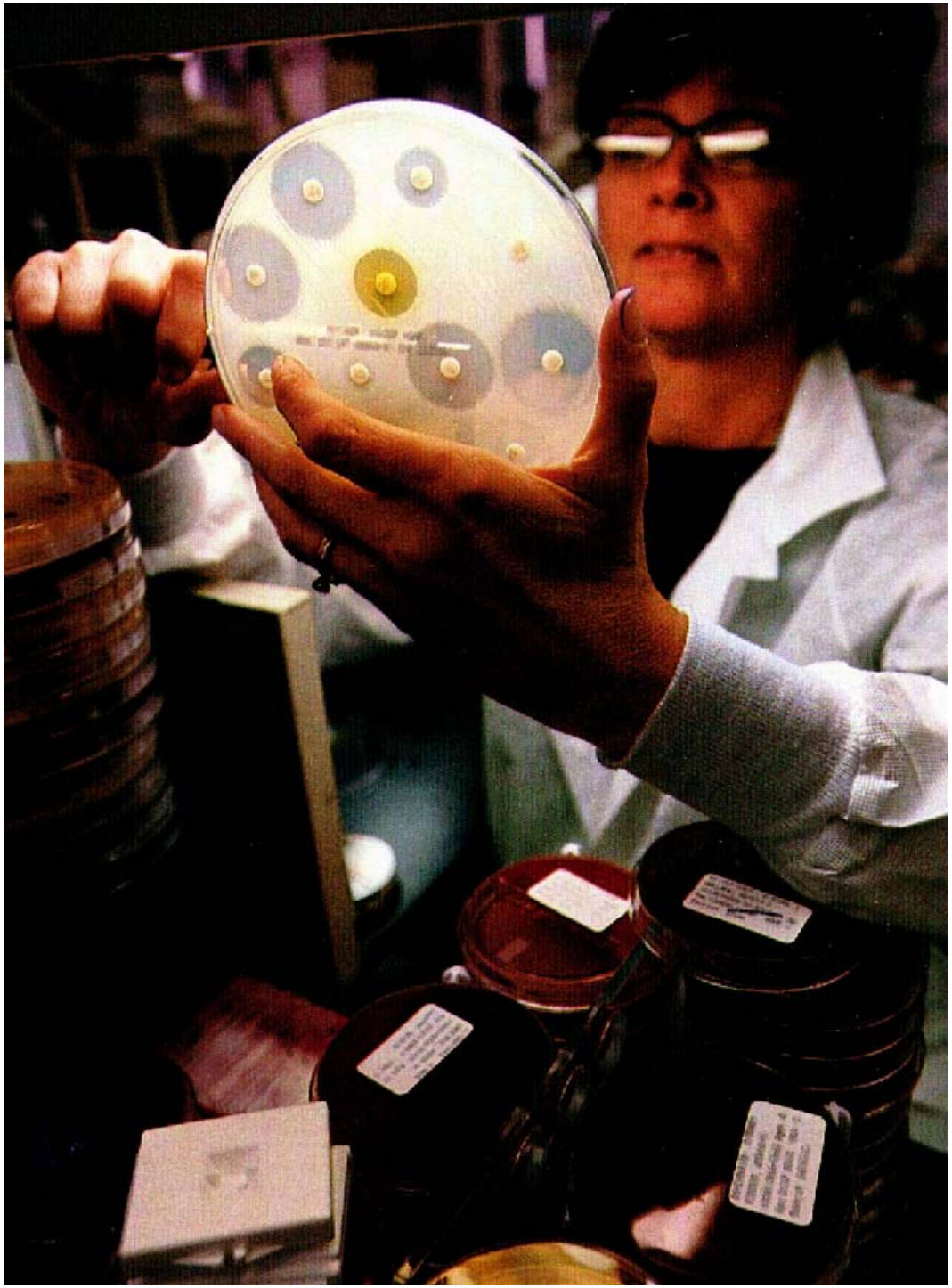
Common Bacteria

Listeria monocytogenes

Able to survive refrigeration, *Listeria* is found in many foods, including soft cheeses and processed meats like hot dogs. Pregnant women, newborns, and people with weakened immune systems are most susceptible.



There are 200 times as many bacteria in the colon of a single human as there are human beings who have ever lived...



Every year some 73,000 Americans
become ill and 60 die – most of them
children – from E. coli 0157:H7

Food Grade Antimicrobials

Behnke Antimicrobial Mix

- Has been incorporated into USDA H1 authorized fluids for years.
- Is approved by NSF as meeting the requirements for H1 in oils and greases.
- Is registered as Micronox®

Micronox® Independent Verification

S-F ANALYTICAL LABORATORIES, INC.

A Subsidiary of Sommer-Frey Laboratories, Inc.

Behnke Lubricants, Inc.
Attn: Sue Bowman
W134 N5373 Campbell Drive
Menomonee Falls, WI 53051

Received Date: 6/4/02
Report Date: 7/15/02

- CERTIFICATE OF ANALYSIS –

HALO GUARD

Procedure: 100 gms of sample was weighed up for each different type of bacteria to be tested. The sample was then inoculated using the corresponding types of bacteria. The *Listeria* sample was inoculated at a level of 100,000 per gram, *Salmonella* was inoculated at a level 110,000 per gram, and *E.coli* was inoculated at a level of 120,000. Each sample was tested once initially for the presence of the bacteria before inoculation. None was found. After inoculation each sample was stored at room temperature and tested every 7-day for a total of 28 days. The samples were analyzed for *Listeria* and *Salmonella* counts using Microbial Content Test Agar that contains Lecithin and Polysorbate 80 to neutralize quaternary ammonium compounds, and Violet Red Bile Agar with MUG for *E. coli*.

Micronox® Independent Verification

Test	Result	Units	Method	
Our Lab #: 02A3047-001			Sample Date:	6/3/02
Your Sample ID: INITIAL				
E. coli	None	/gm	BAM	
Salmonella	None	Detected	BAM	
Listeria monocytogenes	None	Detected	BAM	
Our Lab #: 02A3047-002			Sample Date:	6/3/02
Your Sample ID: 7 DAYS				
E. coli	<10	/gm	BAM	
Salmonella	<10	/gm	BAM	
Listeria monocytogenes	<10	/gm	BAM	
Our Lab #: 02A3047-003			Sample Date:	6/3/02
Your Sample ID: 14 DAYS				
E. coli	<10	/gm	BAM	
Salmonella	10	/gm	BAM	
Listeria monocytogenes	<10	/gm	BAM	

Micronox® Independent Verification

- CERTIFICATE OF ANALYSIS -

Test	Result	Units	Method	
Our Lab #: 02A3047-004			Sample Date:	6/3/02
Your Sample ID: 21 DAYS				
E. coli	<10	/gm	BAM	
Salmonella	10	/gm	BAM	
Listeria monocytogenes	30	/gm	BAM	
Our Lab #: 02A3047-005			Sample Date:	6/3/02
Your Sample ID: 28 DAYS				
E. coli	<10	/gm	BAM	
Salmonella	<10	/gm	BAM	
Listeria monocytogenes	<10	/gm	BAM	

Results: The sample of Halo Guard showed an immediate decrease to a count of <10 for *E. coli*, *Salmonella* and the *Listeria*. This was a significant decrease from the inoculation level for all the cultures. A few counts for Salmonella and Listeria appeared over the 28 day testing period, these counts are of little significance. This sample inhibits growth of all three of the test organisms, and will significantly decrease the population of these bacteria within 7 days.

Gil Kelley

Microbiologist

Micronox® Independent Verification

S-F ANALYTICAL LABORATORIES, INC.

A Subsidiary of Sommer-Frey Laboratories, Inc.

Behnke Lubricants, Inc.
Attn: Sue Bowman
W134 N5373 Campbell Drive
Menomonee Falls, WI 53051

Received Date: 8/22/01
Report Date: 9/26/01

- CERTIFICATE OF ANALYSIS –

Magna Plate 78E

Procedure: 100 gms of sample was weighed up for each different type of bacteria to be tested for. Then the samples were inoculated using the corresponding types of bacteria. The *Listeria* sample was inoculated at a level of 80,000 per gram, *Salmonella* was inoculated at a level 120,000 per gram, and *E.coli* was inoculated at a level of 100,000. Each sample was tested once initially for the presence of the bacteria before inoculation, none was found. After inoculation each sample was stored at room temperature and tested every 7-day for a total of 28 days. The samples were analyzed for *Listeria* and *Salmonella* counts using Microbial Content Test Agar that contains Lecithin and Polysorbate 80 to neutralize quaternary ammonium compounds, and Violet Red Bile Agar with MUG for *E. coli*.

Micronox® Independent Verification

Test	Result	Units	Method	
Our Lab #: 01A04920-001			Sample Date:	8/13/01
Your Sample ID: Initial, Magna Plate 78E				
Listeria monocytogenes	<1	/gm	BAM	
Salmonella	<1	/gm	BAM	
E. coli	<1	/gm	BAM	
Our Lab #: 01A04920-002			Sample Date:	8/13/01
Your Sample ID: 7 Days				
Listeria monocytogenes	<10	/gm	BAM	
Salmonella	<10	/gm	BAM	
E. coli	<10	/gm	BAM	
Our Lab #: 01A04920-003			Sample Date:	8/13/01
Your Sample ID: 14 Days				
Listeria monocytogenes	<10	/gm	BAM	
Salmonella	<10	/gm	BAM	
E. coli	<10	/gm	BAM	

Micronox® Independent Verification

- CERTIFICATE OF ANALYSIS -

Test	Result	Units	Method
Our Lab #: 01A04920-004			Sample Date: 8/13/01
Your Sample ID: 21 Days			
Listeria monocytogenes	<10	/gm	BAM
Salmonella	<10	/gm	BAM
E. coli	<10	/gm	BAM
Our Lab #: 01A04920-005			Sample Date: 8/13/01
Your Sample ID: 28 Days			
Listeria monocytogenes	<10	/gm	BAM
Salmonella	<10	/gm	BAM
E. coli	<10	/gm	BAM

Results: The sample of Magna Plate 78E showed an immediate decrease to a count of <10 for all three different types of bacteria. This sample shows the ability to inhibit and kill *E.coli* ,*Salmonella,* and *Listeria* in a short amount of time.

Gil Kelley
Microbiologist

Micronox® “Knockdown” Performance

Listeria monocytogenes

Week One

- Poly-Guard FG-2 - 99.79%
- Magna-Plate 78E - 99.99%
- Conveyor-Glide - 99.88%
- FGH-AW 46 - 99.97%
- Halo-Guard FG-2 >99.99%
- Halo-Guard Syn FG-2 >99.99%
- Packer Oil 22 - 99.07%

Average - 99.81%

Micronox® “Knockdown” Performance

Listeria monocytogenes

Week Two

- Poly-Guard FG-2 - 99.71%
- Magna-Plate 78E >99.99%
- Conveyor-Glide - 99.98%
- FGH-AW 46 >99.99%
- Halo-Guard FG-2 - 99.99%
- Halo-Guard Syn FG-2 >99.99%
- Packer Oil 22 >99.99%

Average - 99.95%

Micronox® “Knockdown” Performance

Listeria monocytogenes

Week Three

- Poly-Guard FG-2 - 99.96%
- Magna-Plate 78E > 99.99%
- Conveyor-Glide > 99.99%
- FGH-AW 46 > 99.99%
- Halo-Guard FG-2 - 99.97%
- Halo-Guard Syn FG-2 > 99.99%
- Packer Oil 22 > 99.99%

Average - 99.98%

Micronox® “Knockdown” Performance

Listeria monocytogenes

Week Four

• Poly-Guard FG-2	> 99.99%
• Magna-Plate 78E	> 99.99%
• Conveyor-Glide	> 99.99%
• FGH-AW 46	> 99.99%
• Halo-Guard FG-2	> 99.99%
• Halo-Guard Syn FG-2	> 99.99%
• Packer Oil 22	> 99.99%

Average > 99.99%

Micronox® “Knockdown” Performance

Salmonella choleraesius (typhimurium)

Week One

- Poly-Guard FG-2 - 99.99%
- Magna-Plate 78E - 99.99%
- Conveyor-Glide - 99.99%
- FGH-AW 46 - 99.99%
- Halo-Guard FG-2 >99.99%
- Halo-Guard Syn FG-2 >99.99%
- Packer Oil 22 - 99.85%

Average - 99.97%

Micronox® “Knockdown” Performance

Salmonella choleraesius (typhimurium)

Week Two

• Poly-Guard FG-2	> 99.99%
• Magna-Plate 78E	> 99.99%
• Conveyor-Glide	- 99.98%
• FGH-AW 46	> 99.99%
• Halo-Guard FG-2	- 99.99%
• Halo-Guard Syn FG-2	> 99.99%
• Packer Oil 22	> 99.99%
Average	- 99.98%

Micronox® "Knockdown" Performance

Salmonella choleraesius (typhimurium)

Week Three

- Poly-Guard FG-2 - 99.97%
- Magna-Plate 78E > 99.99%
- Conveyor-Glide > 99.99%
- FGH-AW 46 > 99.99%
- Halo-Guard FG-2 - 99.99%
- Halo-Guard Syn FG-2 > 99.99%
- Packer Oil 22 > 99.99%

Average - 99.99%

Micronox® “Knockdown” Performance

Salmonella choleraesius (typhimurium)

Week Four

• Poly-Guard FG-2	> 99.99%
• Magna-Plate 78E	> 99.99%
• Conveyor-Glide	> 99.99%
• FGH-AW 46	> 99.99%
• Halo-Guard FG-2	> 99.99%
• Halo-Guard Syn FG-2	> 99.99%
• Packer Oil 22	> 99.99%

Average > 99.99%

Micronox® “Knockdown” Performance

E. coli O157:H7

Week One

- Poly-Guard FG-2 > 99.99%
- Magna-Plate 78E - 99.99%
- Conveyor-Glide > 99.99%
- FGH-AW 46 > 99.99%
- Halo-Guard FG-2 > 99.99%
- Halo-Guard Syn FG-2 > 99.99%
- Packer Oil 22 > 99.99%

Average > 99.99%

Micronox® “Knockdown” Performance

E. coli O157:H7

Week Two

• Poly-Guard FG-2	> 99.99%
• Magna-Plate 78E	> 99.99%
• Conveyor-Glide	> 99.99%
• FGH-AW 46	> 99.99%
• Halo-Guard FG-2	> 99.99%
• Halo-Guard Syn FG-2	> 99.99%
• Packer Oil 22	> 99.99%

Average > 99.99%

Micronox® “Knockdown” Performance

E. coli O157:H7

Week Three

• Poly-Guard FG-2	> 99.99%
• Magna-Plate 78E	> 99.99%
• Conveyor-Glide	> 99.99%
• FGH-AW 46	> 99.99%
• Halo-Guard FG-2	> 99.99%
• Halo-Guard Syn FG-2	> 99.99%
• Packer Oil 22	> 99.99%

Average > 99.99%

Micronox® “Knockdown” Performance

E. coli O157:H7

Week Four

• Poly-Guard FG-2	> 99.99%
• Magna-Plate 78E	> 99.99%
• Conveyor-Glide	> 99.99%
• FGH-AW 46	> 99.99%
• Halo-Guard FG-2	> 99.99%
• Halo-Guard Syn FG-2	> 99.99%
• Packer Oil 22	> 99.99%

Average > 99.99%