MODULE FORMAT

INRODUCTION:

(A) CORPORATE OBJECTIVE & PHILOSOPHY

(B) " ODE TO THE RACEHORSE" by Winston M. Lopez

(C) PROFILE OF THE FORMULATOR Winston M. Lopez

(D) INDUSTRY PERSPECTIVES

PRODUCT LINE

(A) NAMES OF PRODUCTS: (1)"Heamequine" (2) "Ondeebit" (3)" Acceleration Plus"

(4)" Untie Muscle Ease" (5) "NutiSea (6) Supernatural Plus"

PRODUCT/ CORPORATE ASSOCIATION

(A) Equinox Natural Products Mfg " Heamequine"

(B) LMW Enterprises Mfg "Acceleration Plus"

(C) Acme Enterprises (Canada) "Ondeebit"

(D) Zepol Enterprises "Untie Muscle Ease"

(E) Supernatural Products Ltd "NutriSea" & " Supernatural Plus"

PRODUCT FOCUS

(A) INSTRUMENT IN THE CONDITIONING PROCESS

(B) DELIVER NATURAL EQUINE HEALTH CARE

(C) COST EFFECTIVENESS

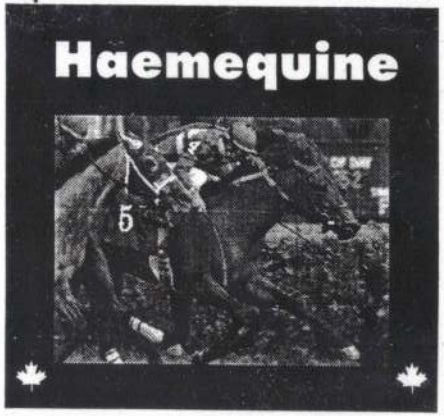
(D) PRODUCTS COMPLEMENT EACH OTHER IN PROVIDING A TOTAL HEALTH CARE PACKAGE.

THE EQUINOX GROUP OF COMPANIE

The Founder, Researcher, and Formulator

1. **Equinox Natural Products Ltd. HAEMEQUINE for EIPH afflicted horses.**
2. **LMW Enterprises/ACCELERATION PLUS for horses affected by Lactosis.**
3. **Acme Enterprises (Canada)/ONDEEBIT a natural energizer.**
4. **Zepol Enterprises/"UNTIE MUSCLE EASE" for horses suffering from Azutoria (Tying Up).**
5. **Equinox International Distributors Ltd The distribution of the products manufactured by the Equinox Group of Companies.**

Equinox Natural Products Ltd.



For EIPH Afflicted Horses
(Bleeders)

Winston Maynard Lopez

Winston Maynard Lopez was born on the Island of Trinidad. From 1960 to 1967 he worked as a laboratory technician in the veterinary diagnostic laboratory at the Central Experimental Station in Arima, Trinidad. During this time he came under the tutelage of several prominent research veterinarians such as Dr. Holman Williams, Dr. Leonard Butcher, Dr. Robert Loregnard, and senior technician Mr. Clive Paris. In 1967, he emigrated to Canada and graduated from British Columbia Institute of Technology in Burnaby and Simon Fraser University, Burnaby, B.C. He has been conducting research in equine supplementation for the past 25 years.

From 1980 to 1985 he assisted a trainer (Brendan Swash, deceased) at Hastings Park in Vancouver, B.C. During this time, he was able to have a first-hand exposure to the health, behavior and medical problems facing the equine population (EIPH, Azutoria, and Lactosis). Finally, in 1994, he began full-time research and development of a product line of natural supplements to address the negative factors which lead to poor performances of equine athletes.

This intense research has resulted in the formulation of the following

ACME ENTERPRISES

"ONDEEBIT"

LMW ENTERPRISES

Thursday, November 20, 1997

Welcome to the site of WML Holdings (Canada) LTD

Corporate mission statement. " We are committed to the Research , formulation Production and Marketing of Natural Products for both the Human and Equine Market Place."

Historical Perspective.

The principal researcher and formulator of the products which have been marketed by the companies within the Holding Group is Winston Maynard Lopez. Mr Lopez is a Canadian Citizen and currently resides in the Province of British Columbia Canada. He was born on the Caribbean Island of Trinidad and Tobago (Republic) and immigrated to Canada in 1967 to attend British Columbia Institute of Technology from whence he graduated in 1969 in Business Management. He then attended Simon Fraser University and graduated with a BA in Arts (Economics) Degree in 1974.

Prior to immigrating to Canada he worked as a Laboratory Technician at the Central Experimental Station in the Veterinary Diagnostic and Research Laboratory which specialized in Virus research such as the Rabies virus. He worked and studied in this position for roughly seven years. During this period of time he benefited by the teachings and supervision under the directions of Dr. Leonard V Butcher, Mr Clive Parris(Phd) Pig Husbandry, Dr. Holman Williams (Professor at the University of the West Indies Veterinary Faculty in the Republic of Trinidad and Tobago. and Dr. Robert Loregnard (Technical Officer Animal Husbandry Ministry of Agriculture). To theses and many others with whom I had the good fortune to be associated with and to learn from in my formative years as a researcher I attribute a great deal of my success.

The evolution of an individual into a devout researcher in most instances is not a chance happening and in my situation the good fortune came in the form of a father ,**Rupert Owen Lopez** (deceased) who was a Pharmacist by profession in an age when the compounding of various formulae was the way of life. Growing up in the presence of such influence and being called upon to assist in the daily routines of compounding syrups, rubbing salves, coughing medications etc. provided me with a foundation which cannot be measured in monetary equivalents. Finally I wish to thank my patron saint. **Saint Jude Thaddeus** for being my daily inspiration in my efforts to surmount the many trying and debilitating obstacles which are encountered by a researcher and his corporations as they grow in stature through personal financing. The products **"Judean"** skin cream which is a natural ointment having remarkable results with skin sores and **"Thaddean"** rubbing cream which is also showing promising results in arthritic situations have been named in honor of this saint who has never failed me in my hour of need. When bankers have failed my corporations and government programs and institutions likewise he has never failed me". Under his guidance and blessing our corporations will continue to deliver natural products to both the human and Equine

markets which will alleviate many of the debilitating infliction's which continues to impose pain and sufferings on their existence.

PRODUCT PROFILE.

Although the individual researcher has been conducting research in the equine arena for some twenty years the actual formulation and production of the current line of Equine and Human products have only commenced in 1993. The product line consists of the following items:

EQUINE PRODUCTS:

(A) " Supernatural" (100% Shark Cartilage Powder for Equine Uses only" (500 gm Containers)

(B) "Haemequine" Natural Powdered Supplement used primarily for the alleviation of Exercised Pulmonary Induced Hemorrhaging **(E.I.P.H.)** in the Equine Athlete.

(C) "Acceleration Plus " Equine supplement a specialty product which interrupts the "Lactic Acid " build in competing animals i.e. Standardbreds, Thoroughbreds, Quarter horses, Steeple chasers and Arabians.

HUMAN PRODUCTS

(A) "THADDEAN" rubbing cream which is a natural product being used in the alleviation of Arthritic conditions. (See Testimonials)

(B) "JUDEAN" skin cream which is showing positive benefits in the treatment of various skin problems (See testimonials.)

Foot note: Extensive time and resources have been invested in the research and possible formulation of a natural supplement which may help in the restoration of sound health to individuals plagued with the ravages of the "AIDS' virus. After the achievement of this corporate goal our resources will be focused on the possibility of formulated a vaccine for the immunization of individuals against the "AIDS" virus (long term goal.)

RECOGNITION'S TO INDIVIDUALS AND ASSOCIATES FOR THE RENDERING OF ASSISTANCE IN CONDUCTING THE FIELD TRIALS ON THE EQUINE PRODUCTS.

There is a biblical verse that states "A prophet is never honored in his country" and this is so true of the aspirations of a privately funded researcher in this country. This presentation will be incomplete without special recognition of the individuals and citizens of countries outside of Canada that have given unconditional support to my equine projects.

A Tribute to the American Horse persons

The birth, formulation, development and marketing of the equine natural supplements **"Supernatural" "Haemequine"** and **"Acceleration Plus"**

By Winston Maynard Lopez.

As I sit and reflect upon the birth; growth , development and marketing of **"Supernatural"** (100% shark Cartilage powder) ", **" Haemequine"** and **Acceleration Plus** I cannot help but salute the trainers domiciled in the United States

of America. These honest open-minded and trustworthy horse people have all recognized the fact that the horse is at the heart of the Industry upon which they depend for their livelihood, racing entertainment, joyful training and ownership experiences. This being their outlooks, they courteously reaches out to someone like myself in search of an answer in the form of a product or a piece of equipment that promises to enhance the well being of their horses. Without these progressive individuals and their healthy outlooks the existence of the above named products would not have been possible.

In early April of 1993 I was introduced to the benefits of 100% Shark Cartilage powder and over the next several years I familiarized myself with all the scientific information that was available on this product. Along with my vast readings and veterinary research background and having spent four years assisting a thoroughbred trainer (Brendan Swash , deceased) at Hastings Park in Vancouver I sensed that the horse racing industry would stand to benefit from the use of this product. With this in mind I approached the manufacturer of a line of 100% Shark Cartilage powder and obtained a contract to the exclusive distributor of their brand of powder for veterinary uses which was named "Sea horse" Having received a positive response we commenced the research and development of Shark Cartilage for veterinary uses and in particular for the "equine athlete". Many long but enjoyable hours were spent testing the use of this product to ascertain the suitable dosages , packaging and finally the preparation and writing of the "Sea horse " brochure.

Once the feeding quantities and benefits were established, the next several months were spent promoting the use of this product to numerous trainers throughout the , United States and Canada. The flagship horse for this study is "Cummerbund" which is pictured on the **Supernatural** brochure. This five year old mare had numerous problems which included the incidence of **(E.I.P.H.)** exercised induced pulmonary hemorrhaging all of which continued to hinder her racing career. During the period in which she was fed with "Sea horse" we kept meticulous on her blood picture and overall attitude towards training and racing. She trained positively, became aggressive and won her first outing on this product convincingly. This positive turnaround prompted the author to send samples to several trainers in Canada, England, Australia, USA and Hong Kong. Much to our joyful satisfaction the horse people in these countries found satisfaction in the use of this feeding supplement.

The marketing and knowledge which was obtained on the varied uses of 100% **Shark Cartilage** (Sea horse or **Supernatural**) was greatly assisted by feedback from trainers Sherry Monroe and John Sadler in California, the horsemen in California and Ed Leonelli in Florida. Turf Paradise in Phoenix Arizona was the first track to embrace the use of 100% Shark Cartilage powder in large quantities. The results were astounding and it was here we obtained the most revealing insights into the equine benefits of the product. These findings were evaluated and passed on to the industry through the world. We are happy to report that the use of this product in the daily rations of the equine athlete has grown significantly.

"Haemequine"

Our findings from the use of either brand names "Sea horse" or "Supernatural' confirmed the fact that the product was not being effective in the alleviation of "Bleeding" (E.I.P.P.) on a consistence basis. We found that over 40% of the animals had bled through a combination of Shark Cartilage and race day diuretics .The author paid attention to these findings and immediately embarked upon the preparation of a formula to try and correct these short comings. A research program was conducted with the assistance of several USA based trainers who had "Bleeders" in their barns and in particular those horses that were not responding to the present state of the science products which were being used.

At this point I wish to extend special thanks to trainer Larry Edwards of "Hot Springs" Arkansas for conducting the field trials on a number of horses on my behalf. He proved to be a prince of a horseman and provided me with one hundred percent cooperation and assistance in the observation and reporting on the recovery of the E.I.P.H affected horses which were being treated with "Haemequine" It was horses in his care that were the first to confirm that the product did in fact achieve the intended goals of alleviating the hemorrhaging of the horses. Based on the positive results which were received the daily knowledge and uses of "Haemequine" is on the upswing. and most of all the long outstanding problems of " bleeding " in the equine industry may be coming under control.

Finally, the author turned his attention to the vexing problem of "Lactic Acid" build up (Lactosis) which has hindered the performance of the equine athlete since time immemorial . The product "Acceleration Plus " has been formulated which addresses the crucial lactic acid imbalance by neutralizing its surplus thereby permitting the racing animal to utilize it's stored Glycogen at a very high level of efficiency. "Acceleration Plus" may greatly assist (E.I.P.H.) horses which are being treated with "Haemequine ". Many of these horses have been the subject of negative psychological fears during their period of "bleeding" An abundance of energy during the stretch drive restores the confidence to these highly competitive animals.

Many thanks to driver trainer/ Mr Robert Summer of Gardinier. Maine , USA for conducting field trials and confirmation on the efficacy of the product. Also a few trainers in Ohio, USA , and Fraser Downs in Cloverdale B. C. Canada.

Salutations and goodwill to the many USA based horse persons for making this research journey possible and to whom I owe endless gratitude for their assistance and unconditional considerations.

Sincerely,

Winston Maynard Lopez.

EQUINOX GROUP OF COMPANIES TRAINING & PRODUCT INFORMATION MODULE

DATE: OCTOBER 1st 1999.

PREPARED BY WINSTON MAYNARD LOPEZ. (FOUNDER, RESEARCHER & FORMULATOR OF THE PRODUCT LINE OF NATURAL EQUINE SUPPLEMENTS

(1) " HAEMEQUINE"

(2) "ONDEEBIT"

(3) "ACCELERATION PLUS"

(4) " UNTIE MUSCLE EASE"

(5) " NUTRISEA"

(6) " SUPERNATURAL PLUS"

CORPORATE MOTTO " HEALTY HORSES WIN MORE EVENTS,
SUPPLEMENTATION MAINTAINS HORSES
IN TOP SHAPE & WINNING CONDITION
OUR PRODUCT LINE REMOVES THE NEGATIVE
HEALTH OBSTACLES TO TOP SHAPE & WINNING
CONDITION.

WE LOOK FORWARD TO ASSISTING ALL SEGMENTS OF THE HORSE RACING & EVENTING INDUSTRY THROUGH OUR HIGH PERFORMANCE & EFFECTIVE SUPPLEMENTATION PROGRAMMES.

SINCERELY YOURS,

Winston Lopez.

WINSTON MAYNARD LOPEZ
FOUNDER, RESEARCHER & FORMULATOR

THE ECONOMICS OF SUPPLEMENTATION IN THE HIGH PERFORMANCE HORSE INDUSTRY

The horse has found itself at the heart of a most dynamic industry with the advent of Simulcasting. The "Global Village" concept can be easily applied to today's horse eventing industry. The horse has become the proverbial " MONEY HORSEPOWER" of a massive financial conglomorate throughout the world.

The author wishes to emphasize the importance of the leading actors in the daily scripts which are presented to the many racing fans worldwide. These academy level performers are the competitive equine athletes. Peak performances are synonomous with top shape excellent health. Top shape comes from an astute conditioning process which falls within the domain of the trainer and his staff. Well being and racing health is in the domain of the Veterinarian, Nutrtionist, Farrier and a little known but vitally important group which are referred to as formulators of equine feeds and supplements who provides the daily nourishment upon which sound health is founded.

Our focus will be confined to the efforts, progress and amazing work of the group called "FORMULATORS" of Nutritional feeds and supplements. Formulators can be described as a cross between Researchers and Technicians who had chosen a specialized area of equine disease or deficience related diseaese and starting with a hypothesis and conducting research and field trials arrives at a formula which brings significant relief to the disease in question.

In our corporate situation our resarch was commenced as early as 1980 by Winston M. Lopez. After years of studies a theory was hypothesized to formulate a supplement from natural ingredients to try and correct the conditions which led to " Bleeding" (Exercised Induced Pulmonary Haemorrhaging) in the competing equine athlete. In 1993 this theory was put into product form and tested in the field with a very high degree of success

ECONOMICS OF NATURAL SUPPLEMENTATIONS

BENEFITS & SPIN-OFFS TO THE FOLLOWING PARTICIPANTS

(1) HORSE (a) Racing & Eventing Stock / current activities
(b) Future activities / breeding & reproduction.

(2) OWNER/INVESTOR

(3) INDUSTRY (a) Racetrack operators.
(b) Racetrack regulators
(c) Goverment Agencies

(4) TRAINERS

(5) JOCKEYS/AGENTS

(6) PUNTER/ INVESTORS

A DETAILED PRESENTATION OF THE ENTIRE PRODUCT LINE
QUESTIONS & ANSWERS FORMAT.

Healthy Horses Win More Money!

F.A.Q.

Q. Why use Natural Supplemens in your daily rations!!!!

A. Horse Power

The term Horse Power in a vehicle originated from a horse being able to draw 33,000 Lb's. at the rate of one foot per minute. Just as one adds higher octane gases and more efficient oil additives to gain higher performances from their vehicle, Horsepersons should do the same for their horses by using our line of natural supplements to gain superb performance.

Supplementation in the Equine industry results in the achievement and maintenance of higher levels of health and performances of the horse population over a longer period of time.

Q. **Why use Haemequine ?**

A. The negative effect upon the high performance of an Equine Athlete are many fold. The two most destructive ones are;

a. **E.I.P.H. (Exercise Induced Pulmonary Hemorrhaging)** which effects 75% of competing horses.

b. **Lactic Acid Build Up (Lactosis)**

Q. Why use **Acceleration Plus** ?

A. **Lactic Acid** builds up which slows down the animal at the most critical stage of the event (the final furlong).

Acceleration Plus neutralizes the build up of lactic acid in the animal's system during the event and consequently avoids the onset of Lactosis

Q. Why use **Supernatural & "ONDEEBIT"**

A. **Hyper-Protemia is the occurrence of a protein deficiency** in competing horses due to the extensive use of proteins as a primary source of energy. Supernatural ensures that there will be no protein deficiency with your animals.

ONDEEBIT supplementation ensures that the animal will derive extensive supplies of energy from the conversion of fats, carbohydrates, and protein in that order. **(FAT IS THE HIGHEST SOURCE OF ENERGY AT 9.4 CALORIES PER KILO CALORIE PER GRAM. WHEREAS CARBOHYDRATES PRODUCE 4.1 KILO CALORIES PER GRAM AND PROTEINS PRODUCE 5.6 KILO CALORIES PER GRAM)**

Q. **Why should an owner** be concerned with the costs of maintaining and racing a horse?

A. When the horses are **performing below their expectation** due to any one of or a combination of the above stated conditions., deficiencies will result in sub-par performance. The solution lies in supplementing the daily rations with a combination of our nutritional products based on the individual needs of each animal.

Q. **Who carries the financial Burden?** Is it the trainer, the jockey, or the racetrack?

None of these! **It's the person who pays the monthly upkeep.**

A. **You the Owner!!**

Winning brings many satisfactions (Status, Excitement, Profits, Acceptance)

Whereas loosing brings frustration, disappointment and an early exit from the ownership status position.

Q. **What makes the playing field equal for the participants in a horse race?**

A. Soundness, excellent conditioning, expert handling (Decision making by jockey or driver) but most of all **healthy, energy charged, non-bleeding horses.** This all comes about through proper supplementation on a regular basis.

Supplementation ensures that your animals will always have adequate reserves of essential amino acids, proteins, carbohydrates, fat, vitamins & minerals which when combined in the correct ratios produces a synergistic effect upon the competing animal.

"An ounce of prevention is better than a pound of cure ! "

Haemequine has established an enviable track record for the treatment of bleeders, over the past 3½ years. We can furnish you with references and testimonials upon request.

Supernatural, Acceleration Plus & 'ONDEEBIT" have all been formulated in the tradition of **"Haemequine"** to provide excellent results to its users in the Equine Industry.

Would you the owner be prepared to allow your horses to deteriorate in health and performance without trying these products. At the earliest signs of bleeding, fading to the back of the pack and general unhappiness of your horses make a quick sensible, profitable decision by recommending these excellent products to your trainer.

"Him who pays the bills should always call the shot."

Double Benefits

Earnings per start increase rapidly & claiming value continually appreciate. Consequently a double monitory benefit accrues to the owner.

Losses become a word of yesteryear.....

The bottom line is

"Healthy Horses Win More Money"

For more information or to place an order:

Acme Enterprises (Canada) Ltd.
4380 Cabot Drive Richmond B.C.
Canada.

Dearest Associate, Norbert.
We will outline a usage protocol for both equine supplements "Acceleration Plus" and "Ondeebit" for the benefit of the intended customers be they trainers, owners or racing officials, always bearing in mind that the individual needs of each horse may be different given it"s racing condition and intended training schedule. It is imperative that the trainers keep a close watch on the progress of their horses as supplementation occurs and in so doing will be able to establish the unique daily requirements of each horse.

PRODUCT	USAGE (Reason)	PROTOCOL
Acceleration Plus	(1)Fast workouts of 4 furlongs plus	Feed one dose (5cg) of supplement in Evening ration on day prior to trial.
	(2)Races of up to 7 furlongs	Feed one dose (5cg) of supplement in Morning ration or orally at least 5 hours Prior to the event.
	(3)Races beyound 7 furlongs	Feed one dose (5cg) of supplement in Evening ration on day prior to race. Also feed one dose (5cg) in morning ration or Orally at least 5 hours prior to race.

NB. The rational for feeding the supplement at least 5 hours prior to the trial or race is to allow the body sufficient time to assimilate the product and store in an easily retrievable state.

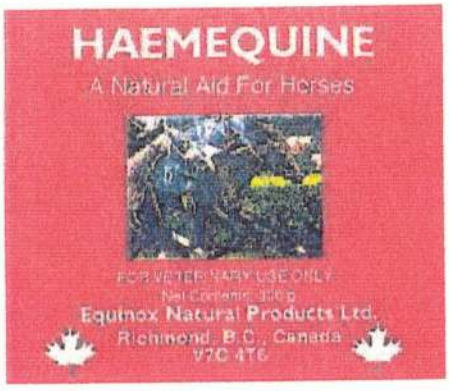
"Ondeebit"	(1)Fast workouts or races.	Feed one dose (50g) in Evening ration On day prior to race. Also feed one dose (50g) In morning ration or orally at least 5 hours prior To race.

NB. This product is of exceptional benefit to horses that tend to leave the gates slowly or lacks natural gate speed.. As the name aptly implies the horses tend to take the bit efficiently and put more concentration and efforts into their race day and training activities.

Should the trainer elect to use both supplements concurrently, we recommend the following protocol.

Feed one dose (50g) "ondeebit" in the evening ration prior to the race or trial and one dose (5cg) of "Acceleration Plus" 5 hours prior to the race.

Should further clarification becomes necessary we will be happy to oblige.



EQUINOX NATURAL PRODUCTS LTD.

HAEMEQUINE

Haemequine is the newest addition to the family of quality supplements designed specifically for the equine athlete.

The development of Haemequine required years of extensive research to isolate and identify those nutrients which are most often depleted under the excessive stresses of training and racing.

Haemequine is an all natural nutritional supplement which is designed for addition to the daily grain ration.

Haemequine is safe, and drug free. There are no known adverse reactions or side affects when HAEMEQUINE is used as indicated.

100% NATURAL

NEW PRODUCT INFORMATION

HAEMEQUINE

A NATURAL AID IN THE FIGHT AGAINST EIPH

Haemequine, a 100% natural feed supplement that can really help your horse.

Recent research on race horses has shown that when horses were scoped immediately after a race, 75% showed indications of varying degrees of exercise induced pulmonary haemorrhaging (EIPH). Quite an interesting fact although I believe most of us realized this before science.

Studies have also shown that horses under the combined stressful conditions of racing and training and with pulmonary bleeding inevitably leads to an overall degeneration of the horses' health condition, lack-luster performance and eventually an early retirement from their racing career.

Haemequine & EIPH

Haemequine was designed to address all aspects of these related health problems. Haemequine uniquely assists the body in meeting the cellular requirements of the haematopoietic (blood forming) system and the vascular (artery, capillary, veins etc.) system of an equine athlete.

- **Haemequine replaces the depleted sources of essential active vitamins, enzymes, minerals and cellular components which are necessary for the formation of blood components. The presence of these varied elements are essential for the healing process to begin.**
- **Haemequine enables the vascular and homeopathic system to interact and perform at their highest levels of efficiency.**
- **Haemequine restores the depleted reserves of the essential building blocks which protects the distressed athlete from becoming prone to pulmonary induced haemorrhaging.**

Trial Results

Studies were conducted on several high performance animals suffering from pulmonary induced haemorrhaging. After twenty eight consecutive days of feeding the recommended dose a drastic reduction in pulmonary bleeding was experienced. The horses involved became visibly healthy in appearance and showed no lack-luster or stressful tendencies.

Haemequine has been throughly tested and could give good results in the majority of cases making it's use clearly indicated in the prevention of bleeding in uncomplicated cases resulting from certain nutrional deficiencies and capillary fragility. While no specific claims can be made that Haemequine will control or cure all cases of bleeding, Haemequine is a treatment to be seriously considered, prior to the administration of commonly accepted diuretic therapy.

Haemeqine is not a Diuretic

Diuretics are known to significantly increase the amount of urine excreted. These losses add

Feed 10 grams (2 scoops) daily added to the daily grain ration.

Before a Strenuous Event:

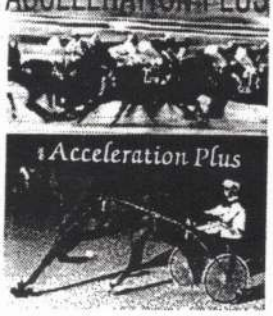
Feed 10 grams twice daily for two days prior to event. This may be added to the grain ration.

If the horse does not accept Haemequine naturally it may be mixed with molasses or drenched.

For OPTIMUM results it is recommended that Haemequine be fed daily for a minimum of twenty-eight successive days.

Haemequine is not recommended for pregnant or nursing mares.

For EIPH Afflicted Horses
(Bleeders)



For Horses Affected with Lactosis

"ONDEEBIT"
A Natural Energizer

Haemequine

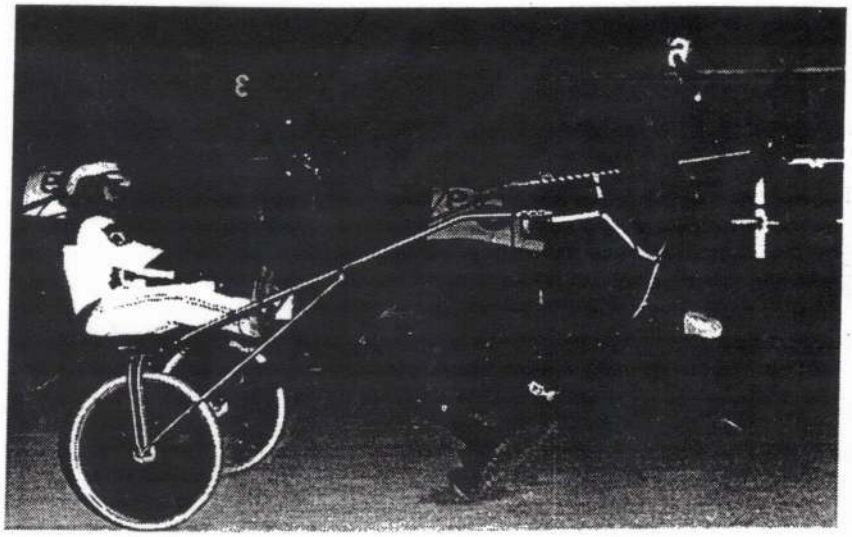
A Natural Aid in the Fight Against EIPH

- **Haemequine** replaces the depleted sources or essential active vitamins, enzymes, minerals and cellular components which are necessary for the formation of blood components.

  The presence of these varied elements is most essential for the healing process to begin.

- **Haemequine** enables the vascular and homeopathic system to interact and perform at their highest levels of efficiency.

- **Haemequine** restores the depleted reserves of the essential building blocks which protects the distressed athlete from becoming prone to pulmonory induced haemorrhaging.



Diuretics are known to significantly increase the amount of urine secreted.

These losses add even more to an already stressed animal which just compounds the problem. Studies have indicated that diuretics do not improve the performance of the horse and further that some diuretics failed to stop bleeding in 62% of the bleeders that were treated.

Haemequine is not a Diuretic

A Specialty Product
Formulated To Aid
Horses Afflicted With
A Bleeding Problem
100% Natural

The Property of Equinox Natural Products Ltd.
Richmond, B.C., Canada

For Technical Information or Questions
Please Call 1-800-994-9688

TRUESDAIL LABORATORIES, INC.

INDEPENDENT TESTING, FORENSIC
AND ENVIRONMENTAL ANALYS
ESTABLISHED 1931

California Horse Racing Board
1010 Hurley Way, Suite 300
Sacramento, California 95825

DATE: March 11, 1998
RECEIVED: March 02, 1998
LABORATORY NO.: 502367

INVESTIGATION: Prohibited Substances

A sealed jar containing an off-white powder was received from Dr. Bell at Santa Anita. The product is called "HAEMEQUINE" and is claimed to be a "Natural Aid For Horses".

As requested, a portion of the powder was examined for prohibited drugs utilizing ultraviolet spectrophotometry and multiple thin layer chromatography.

No prohibited drugs were detected.

Respectfully submitted,
Truesdail Laboratories, Inc.

Robert E. Vessiny

Robert E. Vessiny
Chief Racing Chemist

14201 Franklin Avenue · Tustin, California 92780
Phone (714) 730-6239 · Fax (714) 730-6462

Very Important

Haemequine
Feeding Rate Protocol For Optimum Results In Treating "Bleeders" (E.I.P.H.) Afflicted Horses

(1) Feed 20 grams (4 scoops) daily added to the daily ration for ten (10) consecutive *days.*

(2) Feed 10 grams (2 scoops) daily for the next eighteen (18) successive days.

(3) VERY IMPORTANT:
To assist in rapid and effective healing of "bleeders" it is strongly recommended that the horse be rested from strenuous training, fast workouts and competitive racing during the first twenty-one (21) days of treatment.

How Haemequine Aids Your Horse In Recovering From "Bleeding" (E.I.P.H.)

- **Haemequine** replaces the depleted sources or essential active vitamins, enzymes, minerals and cellular components which are necessary for the formation of blood components.
- **Haemequine** enables the vascular and homeopathic system to interact and perform at their highest levels of efficiency.
- **Haemequine** restores the depleted reserves of the essential building blocks which protects the distressed athlete from becoming prone to pulmonary induced haemorrhaging.

The Property of Equinox Natural Products Ltd.
Richmond, B.C., Canada

For Technical Information or Questions
Please Call
1-800-994-9688

Very Important

Haemequine
Feeding Rate Protocol For Optimum Results In Treating "Bleeders" (E.I.P.H.) Afflicted Horses

(1) Feed 20 grams (4 scoops) daily added to the daily ration for ten (10) consecutive *days.*

(2) Feed 10 grams (2 scoops) daily for the next eighteen (18) successive days.

(3) VERY IMPORTANT:
To assist in rapid and effective healing of "bleeders" it is strongly recommended that the horse be rested from strenuous training, fast workouts and competitive racing during the first twenty-one (21) days of treatment.

How Haemequine Aids Your Horse In Recovering From "Bleeding" (E.I.P.H.)

- **Haemequine** replaces the depleted sources or essential active vitamins, enzymes, minerals and cellular components which are necessary for the formation of blood components.
- **Haemequine** enables the vascular and homeopathic system to interact and perform at their highest levels of efficiency.
- **Haemequine** restores the depleted reserves of the essential building blocks which protects the distressed athlete from becoming prone to pulmonary induced haemorrhaging.

The Property of Equinox Natural Products Ltd.
Richmond, B.C., Canada

For Technical Information or Questions
Please Call
1-800-994-9688

THE EQUINOX GROUP MANUFACTURER / MARKETING OF NATURAL EQUINE SUPPLEMENTS

EQUINOX NATURAL PRODUCTS
EQUINOX INTERNATIONAL DISTRIBUTORS
4380 CABOT DRIVE, RICHMOND, B.C. CANADA . V7C 4T6
Phone/Fax: 604-241-7460 1-800-994-9688 604-272-2914

Haemequine a natural equine supplement used in the fight against Exercised induced pulmonary hemorrhaging **(E.I.P.H.)**

Prepared by Formulator Winston Maynard Lopez.Diploma B.C.I.T, Ba Economics Simon Fraser University Scientific Assistant (7 yrs.) Veterinary Diagnostic and Pathological Laboratory Trinidad & Tobago West Indies Web site http://www.wml.bc.ca/wml/

The author commenced research into the problem of **E.I.P.H.** facing the equine athlete in the racing industry some ten years ago.

HISTORICAL PERSPECTIVE

The incidence of **E.I.P.H**. in the equine industry has been a nemesis since time immemorial. Many a champion horse has fallen victim to this affliction. many a promising young horse's career has been shortened by this ailment. The industry as a whole is trying to find the solutions to the ravages of "bleeding".

The theoretical underpinnings of this product are numerous innovative and very technical and as such an attempt will be made to simplify this dissertation to satisfy the wide range of readers. Suffice it to say that the success strike rate to date in treating **E.I.P.H** affected animals since use an in 1995 has been over 85%.

The first recorded success experienced in treating chronic "bleeders" occurred in 1995 in the state of Kentucky U.S.A. two fairly high priced mares trained by **Larry Edwards** had bled through all known modern day treatments and were about to be turned out to be brood mares. Larry obtained the consent of the owners to give **Haemequine** a chance. On about the seventeenth day of treatment both horses raced to victory without bleeding. Larry recommended the product to several trainers which set the wheels in motion.

The name **"Haemequine"** was coined from the medical terms; haemoglobin and haematopoietic. Specific parameters were set on the ingredient composition of the final product with usage in mind. We stayed with natural ingredients and undertook a holistic approach to the formulation process.

This approach resulted in the following important benefits to the animal and industry's users

1. The product was easy for the body to assimilate
2. No chances of toxicity
3. The product can be used on race day with no breaches of prohibitive substances
4. The usage of the product will be universal. This means that a "bleeder" can compete internationally with no restrictions or disadvantages.

THE EQUINOX GROUP MANUFACTURER / MARKETING OF NATURAL EQUINE SUPPLEMENTS

EQUINOX NATURAL PRODUCTS
EQUINOX INTERNATIONAL DISTRIBUTORS
4380 CABOT DRIVE, RICHMOND, B.C. CANADA . V7C 4T6
Phone/Fax: 604-241-7460 1-800-994-9688 604-272-2914

Field Trial Part I

Period of trial May 31 1995 to October 31 1995

Thirty actively racing thoroughbred horses of varying ages and sexes at locations as listed in Appendix II were selected. All of these animals were in the care of state qualified trainers and veterinarians. All of theses animals were extreme bleeders and had been unsuccessfully treated with all the modern day bleeding medications.

Methodology

All animals were kept in training and fed the recommended quantities of **"Haemequine".** At the end of the 28 days feeding cycle they were raced or trained over 5 furlongs at top speed. All the horses were scooped and found to be negative for **E.I.P.H** bleeding.

Field Trial Part II

A group of twenty talented high expectation but low performing racing thoroughbreds were fed half the recommended daily rations of **Haemequine**. The trainers reported the following observations.

1. After 10 days on the supplement the horses became aggressive in daily training and blowouts. Ate up all of their daily rations. Blood counts moved up sharply on readings. Their coats became glossy and healthy.
2. After 21 days on Haemequine all the horses began to achieve performances in keeping with their expectations. Over 70% of them found their way into the winners circle.

In summation on behalf of the equinox group of companies we wish to thank the readers for affording us the opportunity to make our product known to the market place.

Sincerely,
Winston Lopez
Winston M. Lopez
Equinox Group of Companies

Acme Enterprises (Canada) Ltd.
4380 Cabot Drive Richmond B.C. Canada.

Re: Comparative Benefits and Differences between Equine Health Supplements "Acceleration Plus" and "Ondeebit". Protocol and Usages.

Dearest Colleague, Norbert,

Our Canadian Research and production facility based here in British Columbia is very proud of your marketing efforts in Hong Kong and Australasia in establishing our line of high quality equine supplements.

In addressing your recent inquiry as to the usage differences between our products "Acceleration Plus" and "Ondeebit" we premise our explanation as follows; Our research and development of equine supplements was focused from it's inception on the removal of the negative consequences of high speed performances and at the same time to introduce products with positive results such as the production of high levels of energy.

As your are well aware the two most debilitating effects of high levels of performance encountered by the equine athlete are (E.I.P.H.) " pulmonary bleeding' and the onset of a build up of lactic acid which together prevents the animal from achieving maximum speed and endurance. Our product "Supercharger" addresses the negative "bleeding" problem effectively and "Acceleration Plus" was formulated to neutralize the build up of "Lactic acid" which clogs up the metabolic pathways and prevents the animal's system from transferring the body nutrients from its storage location to the the energy conversion subsystems and ultimately the timely production of performance energy. "Acceleration Plus" when administered prior to an event ensures that the byproduct of the energy production system of "Lactic Acid" is removed so the equine athlete can maximize it's effort in covering a specific distance of ground in it's optimum time. (speed)

Recent research has shown that fatigue results from reactive brief exercises as in training and subsequent racing .On the other hand exhaustion results from prolonged sub maximal exercises. During short term maximal exertion energy is primarily generated by the anaerobic (without Oxygen) metabolic breakdown of carbohydrates, muscle energy stores deplete rapidly and fatigue correlates closely with the excessive production of "Lactic Acid". This also leads to the depletion of Potassium ions which affects neuromuscular functions and reduces the ability of pre muscular arteries to dilate properly and a reduction of oxygen to the muscles occurs. Consequently the animal is forced to slow down at the most crucial stage of the event which happens to be the final furlong of racing

The supplement "Ondeebit" was formulated to perform the function of a catalytic ~~c~~ SIGN CONVERTER of stored energy producing compounds in the body into high levels of energy in a short span of time so an equine athlete can summon energy for short quick bursts of speed during an event. It can be likened to the gas acceleration pedal in an automobile, since the body is predisposed to burn fat as the primary source of energy ahead of carbohydrates and protein. Energy for physiological processes is provided through the combustion of either protein, carbohydrates or fat , or a combination of all three energy producing substances. The ingredient composition of "Ondeebit" encourages the body to convert fat into energy ahead of both protein and carbohydrates and as a result obtains twice the quantity of performance energy within the same time span. This unique phenomena occurs since the ratio of Kilo/Cal per gm of energy derived from these three sources are as follows: Protein 5.6 Cal; Carbohydrates 4.1 Cal; and Fat 9.4 Cal; which clearly identifies Fat as the primary and most efficient source

Acme Enterprises (Canada) Ltd.
4380 Cabot Drive Richmond B.C. Canada.

of performance energy.

In summary one can conclude that both products enhances the health of the equine athlete by approaching the achievement of optimum energy production and maintenance from two different but viable approaches. In short they complement each other and when used together ensures the trainer that his charge will perform at it's expected level and maintain form over lengthy periods of time.

Thanking you for this opportunity to be of assistance to the racing fraternity in Hong Kong.

Sincerely Yours,

Winston Lopez.

Winston Lopez (Research & Development Division).
Acme Enterprises (Canada) Ltd.

ARTICLE BEGINS

Horse Health

by Ruth Davis BVSc and John Kohnke BVSc, RD

"Bleeding" – New Hope (Part 3)

In the last two articles, I outlined the new theory suggesting that the high blood pressures generated in the lung arteries at racing speeds are now thought to cause rupture of the small capillary vessels surrounding the airsacs deep within the lungs.

Although most horses are now known to bleed into their lungs when the pressure is on during the sprint to the post, the severity of the bleed can vary from race to race in any one horse. The signs that are related to bleeding are also often put down to other cases. The advent of more accurate diagnostic methods such as scoping and the lung wash technique (BAL), has enabled more positive identification of bleeders and the cause of the "hidden handicap" that affects performance.

In this final article, we will outline the therapy and management options that should help reduce the severity of bleeding, and in doing so, return full performance ability in a bleeder.

How can EIPH be Prevented or Controlled?

Unfortunately, as bleeding or EIPH appears to be a result of the evolution of the racehorse into a supreme athlete, there is currently no way of preventing bleeding completely.

Is it possible, that by selecting for performance, and breeding the best to the best, breeders may have inadvertently increased the risk of bleeding in racing horses? Superior racing ability is associated with the attributes of large heart size and strength, and necessarily high blood pressure peaks within the lung arteries.

Some authorities believe that selection for speed and performance may have increased the incidence of lung bleeding in thoroughbreds over the past 50 years or so. The thin blood gas barrier required for efficient gas exchange during exercise has not been able to thicken to resist the higher pressures, so it has become the weak link in elite equine athletes.

As outlined above, EIPH appears to be due to rupture of the small capillaries within the lungs as a result of high blood pressures generated within the lung blood vessels during fast exercise.

Therefore, it is logical that if rupture of small capillary vessels results from exposure to extreme pressure high speed exercise, the best way to reduce the incidence of bleeding is to either:

1. Decrease the pressure within the blood vessels in the lung; or

2. Increase the strength of the capillary walls themselves.

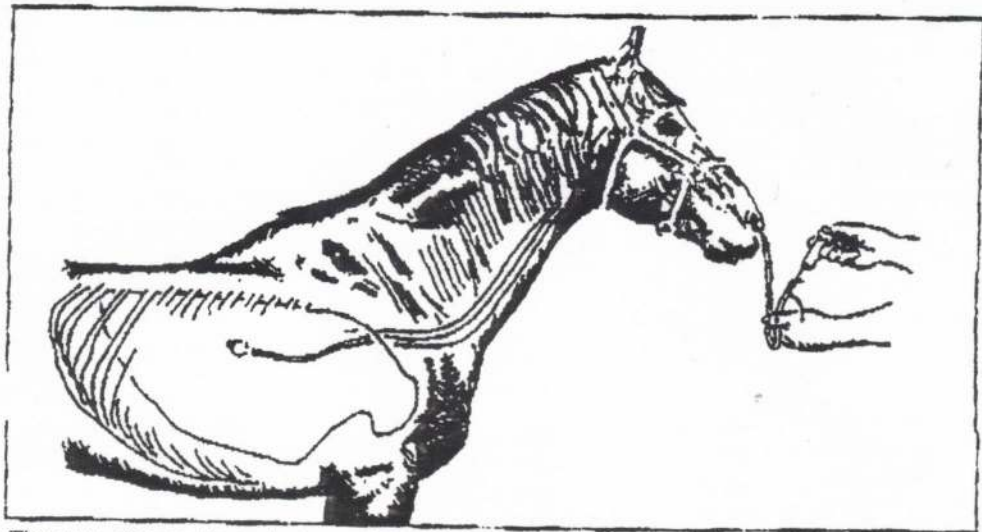
Although blood pressures within the lungs can be decreased by drug medications that are used to reduce blood pressure in human patients, these are not practical in racehorses as they could alter a horse's performance, as well as be easily detected in a swab.

Bleeder "Treatments"

Over the years, there have been numerous remedies and treatments for reducing bleeding in the lungs. These include medications containing Vitamin K and blood clotting cofactors, supplements of Vitamin A and antioxidant cofactors, bronchodilators and steam-inhaling machines to enlarge the small airways and reduce airway obstructions, and a range of supplements usually based on rutin powder. Rutin is a plant extract that was thought to have an effect of reducing capillary fragility or risk of bursting under pressure. However, when the pressures generated have been shown to be up to three times that of elite human athletes, it is little wonder that rutin alone and blood clotting remedies were not very effective.

The evaluation of any "bleeding" medication had been difficult until the advent of the fibreoptic scope, and more recently, the BAL "lung wash" technique. The BAL technique, in particular, has improved diagnosis of accuracy "hidden" bleeders, which do not show upstreaming blood in the windpipe, or at the nostrils.

A horse may not bleed severely enough every time it races to show blood at the nostrils. Therefore, claims for preventing visible bleeding were made for all types of preparations or treatments and in most cases, relatively



The new diagnostic technique of BAL "lung wash" is important in assessing the severity and frequency of bleeding episodes in a horse with a history of poor performance or other signs associated with EIPH.

severe bleeding still occurred unabated deep within the lungs. Careful comparative follow-up before and after treatment was not possible until the development of the BAL technique.

Frusemide or "Lasix"

Overseas, particularly in the USA, the drug Frusemide, known universally by its tradename "Lasix" has been the basis for bleeder control in racehorses. It is administered into the vein within two hours of racing under strict veterinary supervision.

It is thought Frusemide may have beneficial effects due to a number of possible mechanisms, including reduced capillary blood pressure. However, controlled studies have shown it to only be effective in about 10 percent of bleeders.

Additionally, while immediate pre-race medication may reduce the incidence of blood at the nostrils, and therefore an identifiable "bleed" on the racetrack, it may be less successful in reducing the severity of unseen lung haemorrhage, deep within the lung in a "hidden" bleeder.

There has been a lot of controversy over recent years regarding the use of Frusemide, and its true effectiveness in controlling bleeding. In most countries, where strict pre-race medication rules are enforced, horses have to be presented for racing free of medication, including Frusemide. Frusemide has a urine clearance time of up to 96 hours, so that it cannot be used in the immediate pre-race period when it may exert its most beneficial effect.

Despite its widespread use as a bleeding preventative in horses during routine training, studies have shown that it has no long-term accumulative benefit in reducing the severity of bleeding in the lungs. It does, however, when used in the immediate pre-race period, have a possible performance enhancing effect, and that lone precludes its use, even if it were limited strictly to bleeders, under the Rules of Racing adopted by the AJC and other principal clubs in Australia.

A New Development

There is now new hope for bleeders, as a recent development of a nutritional supplement has been shown to reduce the severity of bleeding. This supplement contains a combination of ingredients which act together to increase the strength of the capillaries, decreasing their permeability and increasing their tone.

It is interesting to outline the theory behind this new development which is the first product proven, using accurate BAL lung wash follow-up tests, to reduce the severity of bleeding. Vitamin C and natural plant substances known as "bioflavonoids" have been used in the treatment and prevention of EIPH for a number of years. However, no firm evidence has ever been presented to confirm that these compounds are effective, and some studies have even shown that when used alone, these treatments are of little or no benefit.

However, recent research in Australia has evaluated a combination of a number of ingredients that appear to act synergistically in reducing the severity of EIPH. This product, recently released onto the market as Ekyl, contains two bioflavonoids, hesperidin and permethol, together with Vitamin C and a natural herbal extract. Extensive studies using BAL follow-up tests have indicated that this new combination helps to decrease the incidence and severity of bleeding racehorses.

Originally developed overseas, the combination acts to increase the strength of blood capillaries in a number of ways. It is known that Vitamin C and the bioflavonoids are essential in the formation of collagen, a vital structural component of body tissues. It is the extremely thin layer of collagen which is sandwiched between the capillary blood vessels and the very small airways of the lung that provides the strength of the blood-gas barrier, which is the weak link in the process leading to bleeding.

Studies have also shown that certain bioflavonoids can increase the "tone" of the capillaries, allowing blood to flow through them in an pulsatile manner rather than a continuous flow. As a result, the capillaries are not exposed to the continuous or sustained high pressures generated in the lung arteries during maximal exertion.

By lowering capillary stretch, the risk of rupture and bleeding into the airways is reduced. The addition of the bioflavonoid, permethol, in Ekyl, acts to speed the clotting ability of the blood within the capillaries which aids in the rapid mending of a rupture in the capillary wall if it should occur.

And to complete the formulation, a herbal extract was included that appears to be the most significant of all the ingredients! This herbal extract has been shown to increase the capillary tone or tension of the minute muscles in the vessel walls that helps to limit stretching and the risk of capillary rupture. It may also provide local anti-inflammatory effect to minimise ongoing lung damage after a bleeding episode.

It is known that continuous attacks of bleeding result in inflammation and scarring of the lungs which eventually leads to permanent damage. This scarring in turn increases the likelihood of further bleeding attacks, so the severity of the condition increases as the horse ages.

Extensive studies in Australia using control and treatment groups of horses in a large training stable, as well as follow-up of hundreds of horses in a field trial by veterinarians, indicated that for best results the nutrient combination in Ekyl should be given for at least 10 to 14 days prior to commencing fast work in a known or suspected bleeder. Ideally it should then be continued daily throughout the horse's racing preparation. Luckily, it is classified as a nutritional supplement, and contains no prohibited substances, and therefore does not contravene the Rules of Racing.

Although, of course, this new therapy cannot eliminate EIPH completely, the extensive trials have shown that the severity of a bleed is reduced, and the risk of more severe bleeding episodes, leading to poor performance, is significantly decreased in the long-term bleeders. Daily therapy in a horse with a bleeding problem also decreases the chronic inflammation and scarring of the lung which leads to the permanent damage and impairment of lung function, commonly seen in older racehorses that have suffered continuous attacks of EIPH.

Management Practices to Decrease the Severity of EIPH

There are a number of other management practices that have been adopted over the years to reduce the risk of bleeding from the nose in racehorses.

Whether these alone, or combined with a revised training programme, has a significant benefit in decreasing the severity of bleeding, is not known at this stage. However over the years, veterinarians have found that the following management practices have some logical reason, or have reduced the incidence of horses bleeding during racing.

• EIPH is often associated with other lower airway diseases including inflammation, bronchoconstriction and post viral secondary infection. If these are detected by scoping or BAL examination, treatment should be based on veterinary advice.

Treatment may require antibiotics, bronchodilators or anti-inflammatory drugs. These medications are often delivered to the lungs by nebulisation. Recently a new medication delivery system has become available to specifically target drugs into the lungs.

Known as the Equine Aeromask, this system allows drugs to be administered using dry powder, human, metered dose aerosol "puffers".

The Equine Aeromask has become widely used as a more efficient and less time consuming administration method when compared to standard wet nebulisation.

• It is known that upper and lower airway obstructions may contribute to increased pressures within the lungs. Therefore it is important to diagnose and treat upper respiratory tract abnormalities, such as laryngeal paralysis (roaring) and soft palate displacement, so that airway pressures are maintained within normal limits during an all-out gallop.

• Inflammatory damage to the lungs can weaken the airsacs and airway walls, so it is not wise to gallop a horse suffering from a lung complaint such as a viral infection, or a known allergy to dusty feeds or bedding. Dampen feeds if they are very dusty.

When the lungs are inflamed, the likelihood of bleeding is increased, due to the existence of a "weak" area.

• Hard sustained exercise, or maximal lung inflation can also weaken the lung structure. It is considered important to avoid swimming horses with a known history of EIPH, particularly if the are "hard swimmers".

Over-expansion of the lungs and holding of the bre during swimming may stretch and thin the vessel wa which when subjected to high heart rate and blood pr sures during extreme effort, may rupture and bleed.

• After a severe bleeding attack, a horse should spelled for at least three months to allow healing of t damaged lung tissue. This is of course enforced by t Rules of Racing if the horse bleeds from the nostrils or racetrack.

The physical presence of blood in the lungs caus irritation and inflammation of the tissues which may le to long-term scarring, if severe. This damage must allowed time to heal after a bleed, or else the likeliho of subsequent severe bleeds is increased.

• It is also important to limit dust inhalation especia when working on dusty tracks. Horses inhale 1300 litr of air per minute into their lungs at the flat gallop, a inhaled dust can cause irritation in the lower lung, a may increase the likelihood and severity of bleeding a tacks.

Checklist of management practices to decrease EIP

• Spell for at least three months after a severe blee
• Reduce dust in feed and environment.
• Avoid swimming known bleeders.
• Warm-up adequately before fast exercise.
• Provide a daily supplement of Ekyl to strengthe blood capillaries.

Summary

Bleeding is the case of significant loss of performance many horses. Most horses are "hidden" bleeders wit out external evidence of blood at the nostrils during after a race. Evidence suggests that extremely high bloo pressures are generated in the pulmonary circulation maximum galloping speeds, causing rupture of lung ca illary vessels.

Although there are a number of tell-tale signs that ma lead a trainer to suspect a horse is a bleeder, these ma also be put down to other conditions. The developme of new diagnostic tests has enabled a more thorou examination and interpretation of a horse's airway pro lems.

The new diagnostic technique of BAL "lung wash" important in assessing the severity and frequency bleeding episodes in a horse with a history of poor pe formance or other signs associated with EIPH.

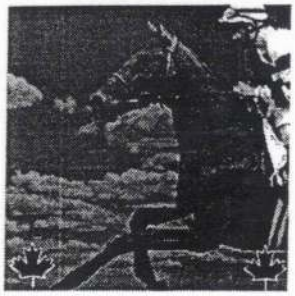
Courtesy Queensland Racing Calend

ARTICLE ENDS

NB: EKYL is not yet registered and available for sale in NZ. It is hoped that registration will be obtained later in 1995.

For Horses Affected with Lactosis

For EIPH Afflicted Horses
(Bleeders)

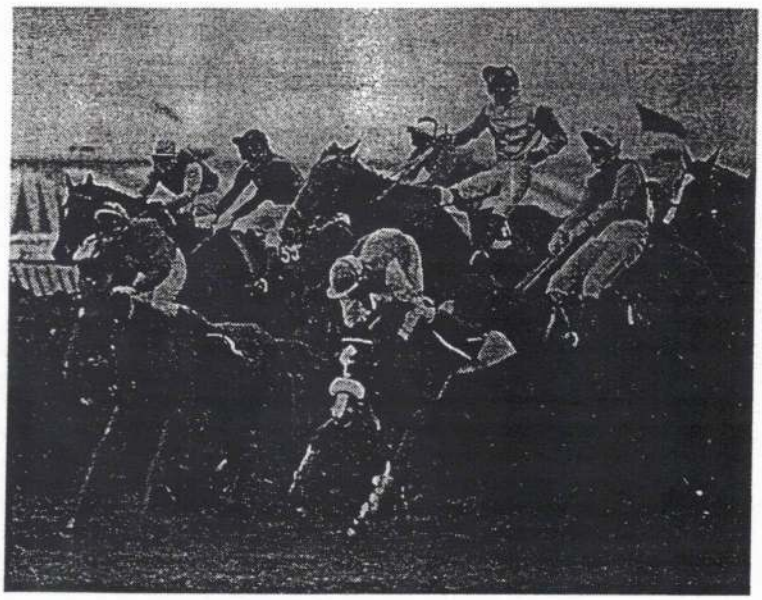


"ONDEEBIT"
A Natural Energizer

ACCELERATION PLUS

BENEFITS

- **Acceleration Plus** eliminates the need to use the prohibitive substance Bicarbonate of Soda (Sodium Carbonate).
- **Acceleration Plus** interrupts the lactic acid cycle during an event thereby permitting the horse to utilize all of it's stored energy.
- **Acceleration Plus** may prevent the onset of Azoturia (tying up in racing stock).
- **Acceleration Plus** may assist (EIPH) horses which are being treated with "Haemequine". These horses have been the subject of psychological negative fears during their period of bleeding. An abundance of energy during the stretch drive restores the confidence to these highly competitive animals.



A Specialty Product

A Natural Aid For Horses

The Property of Equinox Natural Products Ltd.
Richmond, B.C., Canada

For Technical Information or Questions
Please Call 1-800-994-9688

A Speciality Product

100% NATURAL

Acceleration Plus is a natural feed supplement formulated to assist your horse in maintaining it's energy at high levels throughout an event.

Research has shown that when horses are subjected to high performance events such as flat racing, Polo, and Steeplechasing they experience a rapid build up of "lactic acid" Consequently these animals are forced to slow down at the most crucial part of the event such as the stretch drive.

Acceleration Plus addresses this crucial lactic acid imbalance by neutralizing the surplus acid thereby permitting the animal to utilize it's storage of Glycogen at a very high level of efficiency.

BENEFITS

- **Acceleration Plus eliminates the need to use the prohibitive substance Bicarbonate of Soda (Sodium Carbonate).**
- **Acceleration Plus interrupts the lactic acid cycle during an event thereby permitting the horse to utilize all of it's stored energy.**

All of these horses were given the prescribed dosages of Acceleration Plus. All of the horses gained significant positions and lengths during the stretch drive. They showed no visible signs of distress at the conclusion of the event.

What driver/trainers are saying after using Acceleration Plus

Driver/Trainer Robert Sumner of Gardinier, Maine, U.S.A. had this to say about the racing stock which were primed on Acceleration Plus:

- *"My horses were aggressive and a handful during the pre-race warm-up. "*
- *"My horses all gave a 100% effort throughout the race. "*
- *"None of these horses showed any signs of post race fatigue which usually follows an all out effort. "*
- *"Acceleration Plus provides an edge that is financially rewarding through higher earnings."*
- *"It will be of no surprise to me if Acceleration Plus dominates the market for high quality equine boosters or race day primers. "*
- *"The dollar returns from using Acceleration Plus far exceeds the product cost through higher average dollar earnings per race. "*

APPLICATION METHOD

ORALLY

Drench with 4 scoops (20 grams) five hours prior to strenuous event or workout.

Acceleration Plus is not recommended for pregnant or nursing mares.

Product Analysis:	Per Kg
Carbohydrates	38.30%
Proteins	11.60%
Moisture	3.10%
Calcium	29.00%
Magnesium	11.00%
Phosphorus	4.30%
Sodium	.86%
Potassium	.57%
Other Natural Ingredients:	
Minute traces of minerals, copper, zinc, iron, preservative (Para-aminobenzoic	

WESCAN LABORATORIES LTD

No. 12845B

1527 CLIVEDEN AVENUE
DELTA, B.C.
V3M 6P7
(604)-540-4535

REPORT

651 BANNATYNE AVENUE
WINNIPEG, MANITOBA
R3A 0H3
(204)-786-4551

Date received May 27 / 1998 **Date analysed** May 27 / 1998
Requested by LMW Enterprises **Sample condition** Cool

Results: **ONDEEBIT Equine Supplement**

Test	Method	Results
Ash	AOAC 942.05	36.4%
Fat	AOAC 920.39	0.3%
Moisture	AOAC 935.29	6.9%
Protein	AOAC 990.03	36.8%
Carbohydrates	Atwater method (USDA Handbook 74)	19.5%
Calories	Atwater method (USDA Handbook 74)	228 Kcal/100gm

Methodology HPB & AOAC

Remarks All assays were performed according to the methodology shown above. In no event shall Wescan's liability to any client exceed the dollar amount of the assays. Wescan is responsible for results from analyses performed only on product portion submitted to the lab. Results cannot be extrapolated to any portion of product not directly analyzed by Wescan.

Signed _____
by and for WESCAN LABORATORIES LTD

Date 6/3/98

WESCAN LABORATORIES LTD No. 12801B

1527 CLIVEDEN AVENUE
DELTA, B.C.
V3M 6P7
(604)-540-4535

REPORT

651 BANNATYNE AVENUE
WINNIPEG, MANITOBA
R3A 0H3
(204)-786-4551

Date received October 17/1997
Requested by The Equinox Group
Date analysed October 18/1997
Sample condition Cool

Results:

Sample	SPC/g	Salm	Total Coli/g	E.coli /g	Yeast & Mold/g
Acceleration Plus Equine Supplement	<50	NEGATIVE	<1.8	<1.8	<10

Methodology Compendium of Analytical Methods, Health and Welfare Canada, 1989
MFHPB-18, MFHPB-19, MFHPB-20, MFHPB-22

Remarks All assays were performed according to the methodology shown above. In no event shall Wescan's liability to any client exceed the dollar amount of the assays. Wescan is responsible for results from analyses performed only on product portion submitted to the lab. Results cannot be extrapolated to any portion of product not directly analyzed by Wescan.

Signed _____
by and for WESCAN LABORATORIES LTD

Date 10/27/97

"ONDEEBIT"

A Natural Energizer

For Horses Affected with Lactosis

For EIPH Afflicted Horses
(Bleeders)

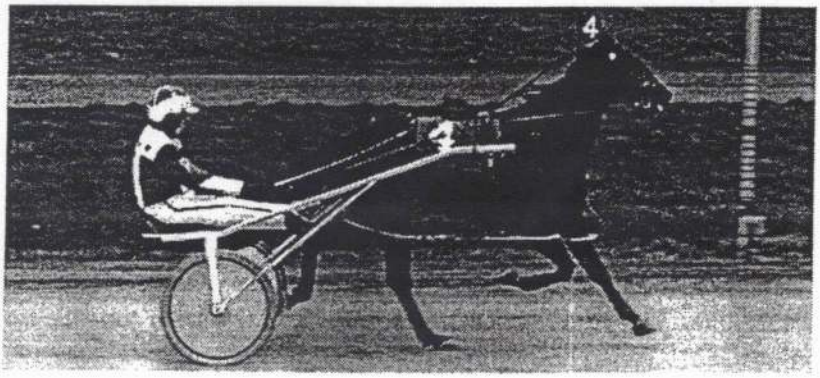
"ONDEEBIT"

A Catalytic Converter

- The Equine supplement **"Ondeebit"** was formulated to perform the function of a catalytic converter. It transforms stored energy producing compounds in the body into high levels of performance energy in a short span of time. This allows an equine athlete to summon energy for short quick bursts of speed during an event.

High Performance

- It can be likened to the use of the gas acceleration pedal in a high performance automobile. **"Ondeebit"** predisposes the body to burn fat as the primary energy source ahead of protein and carbohydrates.



"ONDEEBIT"

A Specialty Product

A Natural Energizer For Competing Animals (Equine)

For Technical Information or Questions
Please Call 1-800-994-9688

Tying-up the loose ends

By William E. Jones, DVM

All athletes experience muscle stiffness and soreness, and the racehorse is no exception. In fact, the racehorse is probably more prone to muscle problems than other athletes because of the huge mass of muscles they have. Extreme muscle cramping leads to tying-up, a term used to describe the condition in the horse where muscle pain becomes so severe that the horse's gait is affected. The scientific term is rhabdomyolysis, or exertional myopathy.

There are many degrees of tying-up, from slightly perceptible to so severe that the horse cannot move at all. The muscles may be trembling; they may be contracted into hard knots. There may be muscle damage which does not perceptibly effect the horse's gait, yet a blood test shows a breakdown of muscle cells. There are many causes of tying-up and the first step in treating the problem is determining which cause is involved. This is not always an easy thing to do, and that may be the reason why treatment of tying-up is not very successful.

There are some general forms of treatment which help most forms of tying-up. Usually the horse needs to relax, therefore acetylpromazine, commonly known as "Ace," is indicated. This tranquilizer helps to reduce muscle contractions. Phenylbutazone, commonly known as "bute," or some other non-steroidal anti-inflammatory drug will help relieve the muscular pain, and makes it possible for the horse to relax a little more. If the horse is dehydrated, intravenous fluids with appropriate electrolytes are administered. Some veterinarians like to include DMSO in the intravenous therapy.

The care and handling of the horse is just as important as the medication. The horse should be allowed to rest quietly, and under no circumstances should the horse be made to exercise right away. The affected horse should be kept warm and dry. The timing of return to normal exercise depends on the cause of the tying-up. Once the initial stiffness is gone, the next day, hand walking the horse can help to loosen up the muscles.

One of the most common causes of tying-up is termed "recurrent exertional rhabdomyolysis." It is seen more in Thoroughbreds and Standardbreds than in Quarter Horses. According to Dr. Stephanie Valberg, an expert in equine muscle problems, about 5 % of Thoroughbred race horses develop this type of tying-up during the racing season, often when they are trained at a gallop but held back from full racing speeds. Because it is more common in fillies, some people think part of the cause may be hormonal, but it is generally considered that an electrolyte imbalance is an important aspect of the problem. There is abnormal intracellular calcium regulation and an elevated myoplasmic calcium concentration.

The diet is an important aspect of solving the recurrent exertional rhabomyolysis problem. A good quality hay should be fed and as little grain as possible to maintain the right energy level. It has been found that feeding a higher level of fat in the grain supplement can provide the needed energy without producing a carbohydrate overload. Horses that experience recurrent exertional rhabomyolysis need regular daily exercise.

Dr. Valberg uses Dantrolene in these horses, given 1 hour before exercise. "Dantrolene is used to prevent malignant hyperthermia in humans and swine by decreasing the release of calcium from the calcium release channel. Phenytoin, has also been advocated as a treatment for horses with this type of tying-up. Therapeutic levels vary, so oral doses are adjusted by monitoring serum levels to achieve 8 µg/ml and not exceed 12 µg/ml. Phenytoin acts on a number of ion channels within muscle and nerves including sodium

and calcium channels. Unfortunately longterm treatment with dantrolene or phenytoin is expensive."

Last fall Dr. Valberg spoke to the British Equine Veterinary Association about here research on tying-up. She has been studying the various causes of this condition for a number of years, and feels that in each case it is important to know early on which type you are dealing with. She listed the various proposed causes as: lactic acidosis, electrolyte imbalances, hypothyroidism, vitamin E an selenium deficiency, over-exertion, heat exhaustion, metabolic myopathies, and abnormal calcium regulation. Early in her studies she came to realize that the main reason why there was so much confusion about muscle problems was that by applying the term "tying-up" to all horses with muscle cramping, specific subsets of exertional myopathies have gone unrecognized.

Over the years, Dr. Valberg has come to utilize a special set of laboratory tests which help to differentiate various types of tying-up. These tests include: a complete blood count; serum chemistry analysis, serum T3 and T4 (thyroid hormones) measurements; renal fractional excretion of electrolytes (to determine electrolyte imbalances); histochemical and biochemical analysis of frozen muscle biopsies (to check the microanatomy of the muscle cells); and treadmill exercise testing.

With these techniques, Dr. Valberg and her colleagues have redefined the etiology of tying-up. Two general categories of cause are now recognized: sporadic exertional rhabdomyolysis; and recurrent exertional rhabdomyolysis. The sporadic type is due to extrinsic factors affecting muscle function. Over exertion causes muscle exhaustion leading to tetany and even muscle cell destruction. Endurance horses experience this type of tying-up when after hours of sweating, the electrolyte balance within the body is altered enough to effect muscle cell contraction. Another extrinsic factor can be a carbohydrate overload, or excessive grain intake without sufficient exercise to use the stored energy.

The recurrent type of tying-up appears to be due to intrinsic muscle defects, or genetic variations in muscle cell structure. One such abnormality has been described as polysaccharide storage myopathy (PSSM). In this situation the biochemistry of the stored muscle polysaccharide (muscle fuel) is abnormal and cannot be used correctly. Another abnormality is an altered biochemical make-up of the muscle cell membrane, so that the movement of calcium ions in and out of the cell is not normal. The level of calcium ions within the cell control muscle contraction.

Dr. Valberg described a mitochondrial enzyme defect which causes severe exercise intolerance after a few minutes of trotting. Mitochondria are tiny cellular organelles in which much of the energy production occurs. This defect results in an excess accumulation of lactic acid in the muscles and blood.

Another cause has been described as neurogenic atrophy resulting from equine protozoal myelitis. Still another cause is myogenic atrophy which develops as a result of Cushing's disease, influenza infection, or muscle trauma. There is also an immune mediated, steroid responsive, myopathy in young horses which may be associated with the bacteria Streptococcus equi. Also, there is an ear tick which can cause severe painful muscle cramping resembling colic in horses.

The inherited muscle abnormality known as hyperkalemic periodic paralysis (HYPP) results in elevated serum potassium and abnormal function of muscles during an episode of paralysis. Another muscle abnormality found in some Quarter Horses, called myotonia dystrophica, can lead to tying-up.

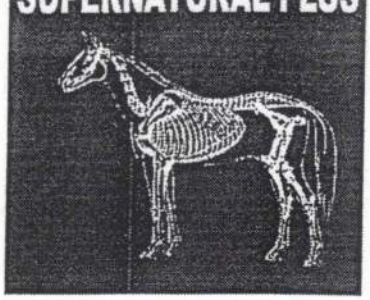
Most of these newly described muscle problems are rare. If you have a horse that is continually plagued with tying-up, it may be that one of these intrinsic causes is to blame, and there may be very little you can do to prevent continual episodes of tying up. On the other hand, if tying-up occurs only occasionally, there

are ways to reduce the incidence.

Since many cases of tying-up occur after a day of rest, it is logical to make sure that exercise is provided daily for horses in a stall. Also, the amount of grain, or supplement should be reduced on those days where little exercise is provided. Be careful with horses that are recovering from influenza and other viral infections which can involve muscles. Give the affected horses more time to recuperate.

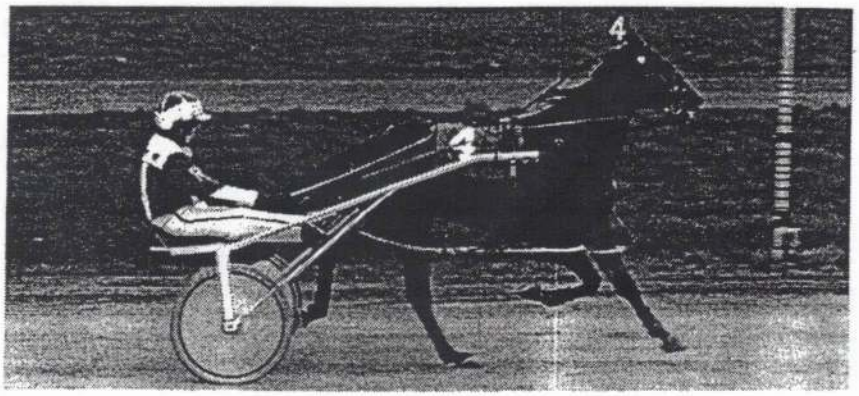
Get a good veterinarian involved in those cases where there is recurrent tying-up. Excuse the pun, but if the exact cause can be determined it will go far towards tying up the loose ends, and a special diet or management program can be established which will be helpful in reducing the episodes. Remember that each horse is an individual and not all tying-up is the same.

Supernatural Products Ltd



INGREDIENTS

- ✔ NutriSea contains essential nutrients that must be provided daily.
- ✔ NutriSea contains nutrients that stimulate the immune system.
- ✔ NutriSea contains nutrients that promote growth and development.
- ✔ NutriSea contains nutrients that provide energy reserves.
- ✔ NutriSea contains nutrients that have a potent anti-inflammatory action, and have shown to reduce intestinal inflammation & ulcers.
- ✔ NutriSea is natural, non-toxic and has no side effects



NutriSea

Feed Supplement for Equine Use

CONTENTS

Approx. per 5 g		
Protein	40%	2000 mg
Mucopolysaccharides	30%	1500 mg
Calcium	12%	600 mg
Phosphorus	6%	300 mg
Other (Fat, Fibres, moisture, minerals)	12%	600 mg

EQUINE FEEDING SUPPLEMENT

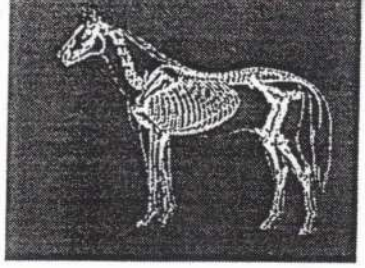
A Source of
Protein, Amino Acids and
Mucopolysaccharides,
Daily Essential Nutrients.

A Potent Anti-Inflammatory
For Treating Stomach Ulcers

Equinox International Distributors Ltd
Richmond, B.C., Canada
1-800-994-9688
Phone/Fax 1 (604) 241-7460
E-mail: wlopez@direct.ca

Manufactured in the U.S.A.

For Technical Information or Questions



Supernatural Plus

Supernatural Plus contains nutrients that reduce joint discomfort.

Supernatural Plus contains nutrients that assist in the repair and maintenance of tissues.

Supernatural Plus contains nutrients useful for the maintenance and long term function of the horse's skeleton.

Supernatural Plus contains nutrients that speed the healing of bones (bucked shins, splints)

Supernatural Plus contains nutrients that inhibit destructive enzymes..

Supernatural Plus contains nutrients that assist in the repair, function and protection of joints.

Supernatural Plus contains nutrients that have shown to reverse the effects of cartilage damage.

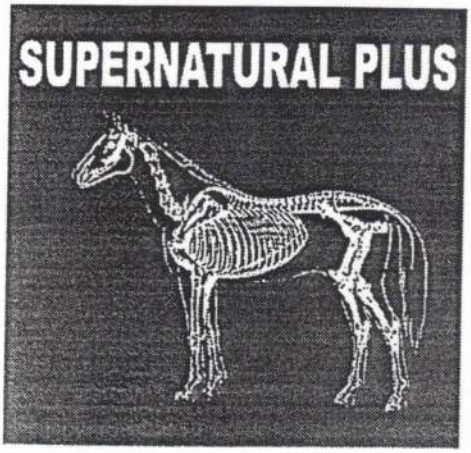
SUPERNATURAL PLUS

Feed Supplement for Equine Use
CONTENTS:

Approx. per 5 g:		
Glucosamine Sulfate	40%	2000 mg
Chondroitin Sulfate	32%	1600 mg
Protein	16%	800 mg
Calcium	6%	300 mg
Phosphorus	3%	150 mg
Other: Fat, Fibers Moisture, Minerals	3%	150 mg

EQUINE FEEDING SUPPLEMENT

Natural Nutrients Proven for Healing of Bones, Protection of Joints, Repair and Maintenance of Tissues and Cartilage



Equinox International Distributors Ltd
Richmond, B.C., Canada
1-800-994-9688
Phone/Fax 1 (604) 241-7460
E-mail: wlopez@direct.ca

For Technical Information or Questions

Sports Medicine Article for The Quarter Racing Journal August, 1998

Treating Degenerative Joint Disease

By William E. Jones, DVM

The joints of horses are delicate structures. Joints make movement of the bony skeleton possible. This is done by providing a cartilage pad at each end of the bone and the connecting ends being covered by a joint capsule full of useful biochemicals, cells, and special tissue. The healthy equine joint is an important part of what makes the horse a superb athlete.

Articular cartilage is capable of absorbing tremendous concussion, while synovial fluid lubricates and protects the soft tissue of the joint. Articular cartilage, seems to be the ideal tissue with which to make joints function best. Unfortunately, articular cartilage is one of the first tissues in the body to age and die, and it has poor powers of regeneration.

All horses develop degenerative joint disease soon or later- some sooner than later. Degenerative joint disease is a wearing away of the protective joint cartilage, causing pain and reluctance to move around. Definitely not a good thing for the racehorse.

Cartilage is made up of chondrocytes, and a matrix, or ground substance. Chondrocytes can grow and function without a blood supply. Actually, articular cartilage is a soft, porous, highly specialized connective tissue composed of chondrocytes, collagen, proteoglycans and water. Proteoglycans are complex biochemicals made of proteins connected to backbones of oligosaccharides on which hang many molecules of chondroitin sulfate.

The surface of the articular cartilage has small, flattened, elongated chondrocytes. There are many tightly woven, closely packed, fine collagen fibers at the surface. This construction provides the best protection against the constant abrasion and friction that occurs in the joint.

Just under the membrane-like surface lies a much thicker layer of cartilage containing a high water content. The chondrocytes here are large and rounder, and are arranged in columns perpendicular to the surface. Deeper, the chondrocytes are larger and the collagen fibers stretch into the calcified layer below. The bottom zone of articular cartilage is partially calcified. Portions of it are turning to bone as time passes.

The unique biophysical property of articular cartilage is brought about by the association between collagen and the proteoglycans. These components bring elasticity and resiliency. In many ways the cartilage matrix behaves like a gel, yet it is very strong.

The proteoglycans in the matrix are produced by the chondrocytes. Proteoglycans collect into a mass, bound by sodium hyaluronate. The proteoglycan aggregates provide both physiochemical stiffness and cartilage permeability. The collagen provides strength and the proteoglycan aggregates impart compressive stiffness. The viscoelastic capacity of the cartilage is determined by the size of the proteoglycan aggregates and the percentage of water in the matrix.

Disease and aging decrease the size of the proteoglycan aggregates and the percentage of water in the matrix. When this occurs, chondrocytes and collagen fibers are susceptible to mechanical damage. Trauma and hard use are major causes of degenerative joint disease in the horse.

Once degenerative joint disease starts, it feeds on itself and becomes worse without more trauma. Injections of sodium hyaluronate can help joints to return to normal more quickly with less permanent damage. Adequan is a drug containing glycosaminoglycans which supplies the necessary building blocks to allow the joint to repair itself and make its cartilage more healthy. It has been the most commonly used treatment in horses for degenerative joint disease, but it is expensive.

Adequan research shows that when the drug is injected into joints, or in the muscle, it binds selectively to damaged or degraded cartilage and enhances the formation of new matrix. There is evidence that the drug also inhibits the destructive lysosomal enzymes within the joint and can help to suppress the causes of joint inflammation.

Over the past few years there have been many claims that oral glycosaminoglycans and the major repeating subunit of that molecule, chondroitin sulfate, are also effective in treating joint disease. Many horse owners are using these oral supplements, claiming to have good results. Until now, there have been no reports of good controlled studies showing the efficacy of these oral products.

This month, a report was published in the Journal of Equine Veterinary Science (September, 1998) which shows significant improvement in joint disease from oral chondroitin sulfate. The study was conducted in Argentina with a chondroitin sulfate product called Arthroglycan (recently available in the United States).

In order to do a good controlled study, it is necessary to have many cases of the same type of lameness in the same location at the same time. This is usually impossible in field trials because each lameness case is a little different and treatment varies depending on the needs of the case, owner preference and other factors. In the Argentina study of chondroitin sulfate, lameness was produced in 15 horses using a substance injected into joints which was used in efficacy studies on Adequan for the FDA. They injected Adjuvant Complete Freund (ACF) into one knee joint of each of the horses in the study. An aseptic arthritis developed, and the circumference of the injected joints increased nearly 25% within two days on those horses which were not treated- those five horses designated as controls.

A second group of five injected horses had received oral chondroitin sulfate from the time of injection and at two days their average joint circumference had increased less than 20%. A third group of five ACF-injected horses had received Chondroitin sulfate injected intramuscularly. There was even less joint swelling in this third group with only a 15% increase in joint size at two days.

The study was continue for a 30-day period. The joint swelling of the untreated horses reduced only slightly and remained greater than 20% enlarged at the end of 30 days. The treated horses showed significant improvement with one week, and at the end of the study joint swelling was less than 10% with no significant difference between the oral or injected chondroitin sulfate.

During the study, other measurements of the severity of arthritis were also made. The degree of joint flexion was measured at intervals during the study, by flexing the leg so as to bring the bulb of the heel to the elbow. It was possible to touch the elbow on all horses before lameness was induced. On the second day after injection of ACF the flexion on control horses could get the heel only within 33 centimeters (cm) of the elbow- a pretty stiff joint. The joints of the orally supplemented horses were also quite stiff, but the joints of those injected with chondroitin sulfate could be flexed to within 20 cm of the elbow. Over the course of the study, the control horses improved a little in flexion of the affected joint, while those treated with chondroitin sulfate improved dramatically. The chondroitin sulfate injected group returned to normal by the end of the study, and the orally supplemented group could be flexed to within 5 cm of the elbow.

During the study, lameness was assessed by making the horse trot after having the joint flexed to its maximum. The grading was on a scale of 0 to 4, with 4 being so severe that the horse would not touch the foot to the ground. Two days after inducing lameness, the control horses and those treated with oral chondroitin sulfate averaged around 2.5 in lameness grade, with those treated intramuscularly graded on average at 2.0. By the end of the study, all of the treated horses had returned to normal, but the control group averaged 1.5 grade lameness.

The injected ACF was irritating to the joint. As swelling increased, enzymes were released within the joint (a natural phenomenon in joint swelling), causing destruction of cartilage. As joint tissue and cells are destroyed, the joint fluid increases in protein debris. The amount of protein in the joint fluid of these horses was measured at the beginning of the study, mid-way, and at the end. The beginning normal was around 16 milligrams of protein per milliliter of joint fluid. At 15 days after induction of lameness, the control horses averaged over 47 mg/ml, while the treated horses had only about half as much, indicating less protein debris.

The study showed that there is a quicker response to the intramuscular injection of chondroitin sulfate compared to the oral administration. However, at the end of the study (30 days), the improvements in both methods of treatment were quite similar. One aspect which was not analyzed directly in this study was whether preventive therapy is helpful. In other words, how would the lameness severity have been effected had the treatment been started a few weeks prior to the initiation of the lameness.

This is a significant study which allows horse owners and trainers to treat degenerative joint disease with oral proteoglycans or chondroitin sulfate products with more confidence. More studies will undoubtedly follow. It would be helpful to have a field trial of old horses with degenerative joint disease to see the true effect of these oral products on chronic arthritis.

The Nutritional Supplement Advisor

Mucopolysaccharides (Chondroitin Sulfates) As Dietary Supplements: Sources, Production and Comparative Bioavailability

by Luke R. Bucci, Ph.D.

The previous column, which dealt with nutritional support for osteoarthritis, mentioned chondroitin sulfates. This installment will explore the class of products known as mucopolysaccharides or glycosaminoglycans. We will find out what product options are available, how these products are made and what that means to you and your patients.

Chiropractors are always in touch with connective tissue. Bones are surrounded by it, and in various forms, connective tissue holds us together on every scale from molecular to whole-body scales. Doctors frequently overlook the health of connective tissue because it is not a single, easily identifiable organ like a heart or liver, but is extracellular. Connective tissue is everywhere, and when connective tissues suffers, so do the organs involved. Practically every abnormal condition affects or alters connective tissue in some way. This pertains not only to joints, but also to blood vessels, skin, hair, eyes and all the compartments between bodily structures, like "ground substances" or basement membranes. For the interests of chiropractors, the next two columns will feature use of mucopolysaccharide products for connective tissue healing and cardiovascular effects.

What are mucopolysaccharides or glycosaminoglycans?

Connective tissues are made of three principle ingredients: water, collagens and proteoglycans. Collagen is a fibrillar protein that gives structural integrity to connective tissue. We will focus on proteoglycans, the updated name for mucopolysaccharides. Because connective tissue is physically strong and tough, scientists have had a difficult time correctly breaking down and characterizing proteoglycans. Basically, proteoglycans are a combination of long chains of special, modified sugars (oligosaccharides) known as glycosaminoglycans (GAGs) that are lashed together much like Oriental bamboo scaffolding by special, modified proteins. There are six separate GAGs: hyaluronic acid, chondroitin sulfates, dermatan sulfates, keratan sulfates, heparan sulfates and heparin (which is not structural and be ignored). It is not really importan know exactly which modified sug make up each GAG. It is important know that chondrocytes must t dietary carbohydrates (sugars) and w enough energy, protein, vitamins a minerals, convert those sugars into modified ones needed for GAG synt sis. A GAG must then be strung gether, cast out into the extracellu matrix, worked over by enzymes t control 3-D structure of GAG and col gen chains, merged with other GA and collagen to form desired structur then "cured" by other enzymes harden and solidify the new connecti tissue.

Sources of GAGs

Major sources of GAGs for nutritio al supplements include cartilage, she fish and plants. An abundant supply cartilage in the form of bovine trache aorta, nasal septa and other pieces available from abattoirs. Cartilage fro other animals (whales, pigs or sheep) a generally not routinely collected. Sha

but supply is more erratic than beef trachea and is more subject to contamination (ever smell a day-old dead shark?). These sources of cartilage must be processed in order to achieve a stable, reproducible, workable powder. Usually, partial digestion of trachea or cartilage with acid and/or pepsin or other proteolytic enzymes is employed. Different suppliers use different methods, resulting in varying purities of GAGs, but all are referred to as trachea or cartilage powders.

Another source of GAG for products is the green-lipped mussel, Perna canaliculus, harvested from tidal pool farms in New Zealand. Normally, the contents of the entire mussel (minus the shell) are freeze-dried. Although claimed to be rich in GAGs, there is very little accessible scientific literature that has characterized Perna GAGs.

Many plant sources for GAGs are available, but digestion of these by humans is more difficult, meaning plants are usually poor sources for GAGs. The several different types of carageenans from seaweeds are one example.

Thus, beef trachea is the major source of cartilage powder for supplement products. However, the story does not end here, but continues with further purification of GAGs.

Chondroitin Sulfates

The major GAG in mammals is chondroitin sulfates (CS). Methods for commercial purification or enrichment of CS exist, and products containing purified CS have been available for over seven years. CS was shown to be the active fraction of cartilage powder, unlike the collagen portion (which when boiled becomes gelatin). When CS is purified from cartilage powders, several advantages are apparent. First, a known and reproducible entity is available. This is important for consistent dosing over long time periods, especially critical for medical research. Second, the uptake is reproducibly increased. Third, potential allergenicity from bovine collagen or its fragments is bypassed. Injectable cartilage powders caused allergic reactions in both animal and human studies, whereas purified CS has not elicited adverse reactions. Fourth, lesser amounts of CS are needed compared to cartilage powder, meaning patient compliance is improved.

Potential drawbacks of purified CS and loss of minor GAGs such as keratan sulfate. Since purified CS is 3-10 times more effective than an equal amount of cartilage powder, the higher cost is actually negated, and purified CS is often more cost-effective. Loss of unique sugars from minor GAGs does not appear to dampen the effectiveness of purified CS, probably because chondrocytes can synthesize these unique sugars from those found in CS.

There are two forms of CS — chondroitin-4-sulfate (CSA) and chondroitin-6-sulfate (CSC). CSB became dermatan sulfate. While there is still some controversy, as a dietary source for modified sugars, there appears to be no significant difference between the two types of CS. Usually CS-6 will predominate in purified CS products.

Purified CS is extracted from cartilage or cartilage powder by digestion of collagen with heat, acids or enzymes, followed by various salt or solvent extractions to recover CS. Since the end product is similar from each purification scheme, the only concern about the process would be possible use of toxic solvents.

Comparative Bioavailability

Many cartilage preparations are not well-characterized. They can range from dried trachea to almost pure CS. As a result, uptake studies on cartilage powders are lacking. Hypothetically, more purity should give more absorption of modified sugars. Cross-linked collagen is very difficult to digest, and incomplete digestion would trap proteoglycans, rendering them unabsorbable. Therefore, absorption of GAGs from cartilage powders is likely to be highly variable, and is not predictable for a particular individual product.

In contrast, purified CS absorption has been studied in man and animals. Ninety percent of radioactivity (from radioactive sulfur) after a one gram dose of labeled CS was recovered in the urine of normal humans within four days. Eight percent of this radioactivity was attached to large molecular weight GAGs, while the remainder was degraded to free sulfate. This means that oral CS is absorbed from the digestive tract into blood and is taken up and metabolized by tissues, which obviously have the ability to uptake large molecules of CS. Other studies showed that CS was absorbed intact into the blood as well as partially and completely degraded to free sulfate. Studies also showed that absorbed CS stayed around in the body with a half-life of 12-24 hours, meaning once daily dosing may be sufficient to saturate tissues. What is still not well known is specific uptake of modified sugars by chondrocytes. Animal studies suggest that chondrocytes do utilize absorbed CS, and positive human clinical trails also offer support of this notion.

Summary

Mucopolysaccharides, now known as glycosaminoglycans (GAGs), are available in crude and purified forms. Crude forms include varying grades of cartilage powders (usually from beef trachea), dried mussels or seaweed extracts. Availability of active components (GAGs) is not well known for each crude preparation, but they still represent a useful dietary source for GAGs. On the other hand, purified chondroitin sulfates are also available. Absorption has been studied and shown to be nearly complete. For purposes of cost effectiveness, reproducibility of results, patient compliance and physician confidence, purified chondroitin sulfates products offer advantages over cartilage powders.

Dr. Bucci received a doctorate in Biochemistry/Cell Biology from the University of Texas and a Bachelor of Science in Chemistry from St. Edwards University. He has spent six years in cancer research at M.D. Anderson Hospital in the Texas Medical Center and has been the Research Director of Biotics Research Corporation since 1984.
