

# The Effektri Health Concept for animals

## Horses – Equi

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by

**Dr. Med. Harmen Hofstra** (OHO EHF)

**Mrs. Janneke Hofstra** (BioActri BV)

**Mr. Ola Eide** (Akobe AS)



## Background

The Effektri Health Concept for animals consists of an Effektri dried blood spot test to identify potential diet related problems in the metabolism of fats, and the Effektri oil to “**Restore and Maintain optimal fat metabolism**”. Table 1 shows the 11 fatty acids (98 % of the fatty acids in the blood) that are measured by the Effektri dried blood spot test for animals, using horses as an example. The focus of the test is on the essential polyunsaturated Omega-6 and Omega-3 fatty acids (8 of the 11 fatty acids measured), but also saturated- (C16:0, C18:0) and monounsaturated (C18:1) fatty acids are measured.

Horse Name	Breed	Effektri	C16:0	C18:0	C18:1	C18:2, LA	C18:3, ALA	C18:3	C20:3	C20:4, AA	C20:5, EPA	C22:5	C22:6, DHA
Esmee	Dutch warmblood	yes	16,8	19,5	24,5	33,5	3,7	0,0	0,2	1,0	0,6	0,1	0,2
Game boy	Dutch warmblood	yes	18,8	21,7	21,3	32,7	3,7	0,0	0,0	1,1	0,2	0,2	0,4
Gentleman	Dutch warmblood	yes	17,4	20,5	22,7	34,3	3,5	0,0	0,0	1,1	0,2	0,2	0,3
Diva	Dutch warmblood	yes	17,9	19,9	24,7	31,3	3,6	0,0	0,3	1,3	0,6	0,4	0,0
Cezzane	Dutch warmblood	no	17,7	18,8	23,3	32,2	6,3	0,0	0,3	1,0	0,2	0,2	0,2
Enjoy	Dutch warmblood	no	17,7	19,0	23,3	33,1	4,6	0,0	0,2	1,4	0,7	0,0	0,0
Carlos	Dutch warmblood	no	18,5	18,2	21,0	35,5	4,9	0,0	0,0	1,4	0,0	0,0	0,5
Aliz	Dutch warmblood	no	17,9	18,0	21,9	35,6	4,7	0,0	0,4	1,0	0,3	0,1	0,0
Harley	Dutch warmblood	no	17,2	22,1	21,1	35,0	2,5	0,0	0,5	1,5	0,0	0,0	0,0
Maddy	New Forest poney	yes	21,1	16,5	22,8	30,8	5,5	0,0	0,0	1,7	0,8	0,4	0,4
Florence	New Forest pony	no	21,0	16,5	28,8	27,4	4,6	0,0	0,4	0,8	0,4	0,0	0,0
Floor	New Forest pony	no	23,5	17,6	25,2	29,4	3,3	0,0	0,0	1,0	0,0	0,0	0,0
Wimlex	NRPS	no	18,5	19,1	23,3	32,1	4,7	0,0	0,2	1,0	0,3	0,4	0,4
Naomi	NRPS	no	18,6	18,9	24,7	31,9	3,7	0,0	0,0	1,2	0,5	0,5	0,0
Ezra	NRPS	no	18,4	21,2	21,5	33,9	3,5	0,0	0,0	1,5	0,0	0,0	0,0
Switch	Shetlander	no	20,0	19,9	21,0	32,6	4,0	0,0	0,4	1,0	0,6	0,4	0,2
Fred	Unknown	yes	19,0	19,0	18,6	35,3	3,8	0,0	0,7	1,6	1,0	0,3	0,5
Jardo	Arabic mix	no	18,6	19,7	26,3	29,1	4,5	0,0	0,3	0,9	0,5	0,0	0,0
Spook	Welsh A	no	18,5	18,8	21,2	34,5	5,3	0,0	0,0	1,3	0,4	0,0	0,0
Bor	Haflinger	no	19,0	20,0	23,2	31,8	4,3	0,0	0,3	1,1	0,4	0,0	0,0

Table 1. Fatty acids measured in the Effektri Health Concept for Animals

The composition of the 11 fatty acids jointly influence “**The flexibility of cell membranes**”, a condition that is essential for active, healthy animals. Flexible blood cell membranes are needed to bring blood to all parts of the animal body, since the diameter of a blood cell is comparable to the diameter of the smallest capillary blood vessels. Stiff blood cells may not penetrate the capillaries, and the animal may not get the blood to all parts needed for optimal performance.

The “**Inflammatory climate**” influences both acute and chronic conditions. The inflammatory climate is characterized by the composition of polyunsaturated long chain fatty acids ( $\geq 20$  carbon atoms in the fatty acids chain) of the Omega-6 type (C20:3 + C20:4) and Omega-3 type (C20:5 + C22:5 + C22:6). These fatty acids are all measured by the Effektri dried blood spot test.

The Effektri Health Concept guidelines are consistent with the principle of “**Safe Feed for Animals**”. The composition of Effektri oil does not induce changes in lipid peroxidation in the animal body, which might raise concern in relation to cardiovascular disease (CVD) risk, as well as other chronic conditions. The oxidative stability of Effektri is secured by the combination of fish oil and a specially selected olive oil. During inflammation, several cell types secrete phospholipase A2 that catalyzes lipid oxidation in bad cholesterol, the LDL particles in blood. Lipid oxidation results in the generation of aldehydes that substitute lysine residues in the apolipoprotein B-100 moiety. Lipid together with protein oxidation in bad LDL cholesterol results in the generation of the harmful oxidized LDL. A cause and effect relationship has been

established between the consumption of olive oil polyphenols (standardized by the content of hydroxytyrosol and its derivatives) and protection of LDL particles from oxidative damage. This principle has been built into Effektri oil, a principle that also works to stabilize the oil against lipid peroxidation on the shelf, as seen in Figure 1.

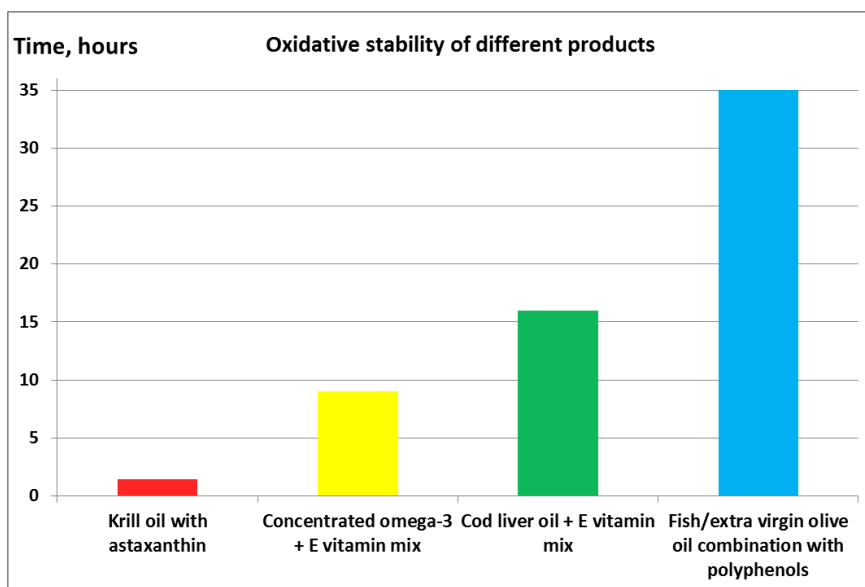


Figure 1. Oxidative stability of fish oil products protected by different antioxidants using the AOCS Official Method Cd12b-92.

### Dietary Index ((SAFA + MUFA)/LC-omega-3)

The fatty acid composition of blood cell membranes is in equilibrium with the fatty acid composition of whole blood. In cell membranes saturated- (SAFA) and monounsaturated fatty acids (MUFA) provide stiffness due to the shape of these fatty acids, while polyunsaturated fatty acids (PUFA) provide flexibility. Long chain omega-3 PUFA (LC- omega-3) and long chain omega-6 PUFA (LC- omega-6) are important structural components of cell membranes and contribute to various membrane functions such as fluidity, permeability, activity of membrane-bound enzymes and receptors, and signal transduction. The sources of LC-omega-3 and LC-omega-6 are essential and must be supplied through the diet. A normal diet provides a surplus of both LC-omega-6, SAFA and MUFA. These components shape the cell membrane functionality when LC-omega-3 is depleted. The food supplement Effektri provides LC-omega-3 to a normal diet, increasing the LC-omega-3 in blood. Finding a new equilibrium with the fatty acid composition of the whole blood, many of the SAFA and MUFA in cell membranes will be substituted by LC-omega-3 making the cell membrane more flexible and functional.

Table 2 and Figure 2 show that Effektri added to the diet is effective in reducing the ratio between (SAFA + MUFA) and LC-omega-3 in whole blood independent of breed, providing flexibility and functionality to cell membranes. The data also shows that horses with reported physical problems have an elevated ratio between (SAFA + MUFA) and LC-omega-3 in whole

blood. The exception being the Shetland pony Swift, who's problem may arise from other causes than fat metabolism.

Horse Name	Breed	Effektri	C16:0	C18:0	C18:1	C20:5, EPA	C22:5	C22:6, DHA	(SAFA+MUFA)/LC-omega-3		Comments
Diva	Dutch warmblood	yes	17,9	19,9	24,7	0,6	0,4	0,0	62,5		
Esmee	Dutch warmblood	yes	16,8	19,5	24,5	0,6	0,1	0,2	67,6		
Game boy	Dutch warmblood	yes	18,8	21,7	21,3	0,2	0,2	0,4	77,3		
Enjoy	Dutch warmblood	no	17,7	19,0	23,3	0,7	0,0	0,0	85,7		
Gentleman	Dutch warmblood	yes	17,4	20,5	22,7	0,2	0,2	0,3	86,6		
Cezzane	Dutch warmblood	no	17,7	18,8	23,3	0,2	0,2	0,2	99,7		
Carlos	Dutch warmblood	no	18,5	18,2	21,0	0,0	0,0	0,5	113,1		Problems of behavior, stomach problems and stiff muscles
Aliz	Dutch warmblood	no	17,9	18,0	21,9	0,3	0,1	0,0	144,5		Itchy skin
Harley	Dutch warmblood	no	17,2	22,1	21,1	0,0	0,0	0,0	6040,0		
Maddy	New Forest pony	yes	21,1	16,5	22,8	0,8	0,4	0,4	37,8		
Florence	New Forest pony	no	21,0	16,5	28,8	0,4	0,0	0,0	165,8		
Floor	New Forest pony	no	23,5	17,6	25,2	0,0	0,0	0,0	6630,0		Itchy skin - light summer eczema
Wimlex	NRPS	no	18,5	19,1	23,3	0,3	0,4	0,4	55,4		
Naomi	NRPS	no	18,6	18,9	24,7	0,5	0,5	0,0	62,2		
Ezra	NRPS	no	18,4	21,2	21,5	0,0	0,0	0,0	6110,0		Tendon problem
Fred	Unknown	yes	19,0	19,0	18,6	1,0	0,3	0,5	31,4		
Switch	Shetlander	no	20,0	19,9	21,0	0,6	0,4	0,2	50,8		Problems with the joints
Jardo	Arabic mix	no	18,6	19,7	26,3	0,5	0,0	0,0	129,2		Unknown auto immune disease
Spook	Welsh A	no	18,5	18,8	21,2	0,4	0,0	0,0	146,3		
Bor	Haflinger	no	19,0	20,0	23,2	0,4	0,0	0,0	155,5		To fat

Table 2. Calculating the Dietary Index from fatty acids composition of whole blood in horses.

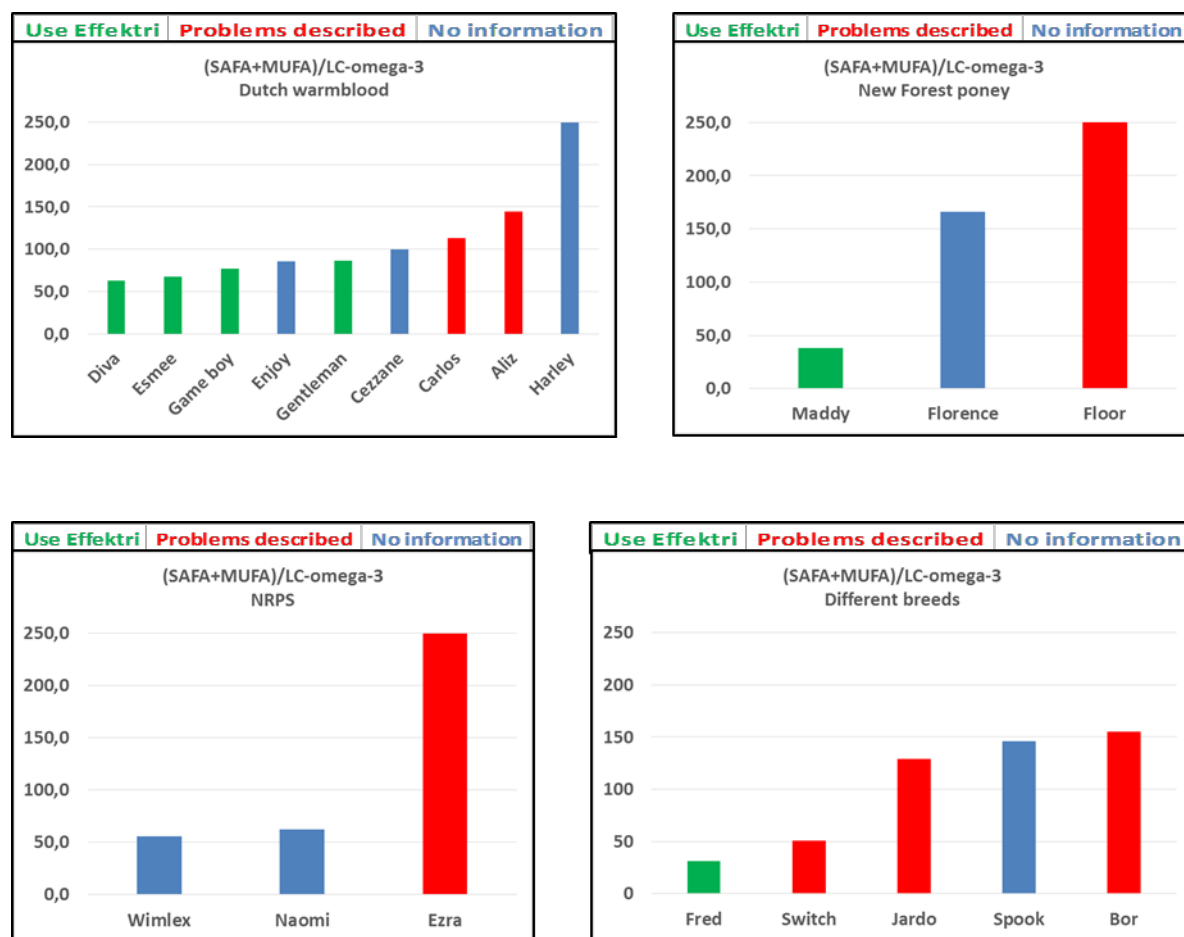


Figure 2. Dietary Index for individual horses of different breeds taken from Table 2. Horses that are taking Effektri oil are marked green. Horses with known chronic lifestyle ailments are marked red.

## Pro-inflammatory index (% LC-omega-6 of total LC-PUFA)

Many horses are afflicted with chronic lifestyle ailments such as problems of behavior, stomach problems, stiff muscles, respiratory system problems, itchy skin, summer eczema, tendon problems, joint problems, autoimmune diseases, dietary allergies and obesity. Most of these problems are caused by chronic inflammation supported by poor eating, poor sleeping schedules, daily stress and more. Chronic inflammation is characterized by the imbalance between the ratios of anti-inflammatory versus pro-inflammatory eicosanoids. Eicosanoids are hormones, which in turn control other hormones and practically all have important functions in the body, e.g. the central nervous system and the immune system. Thus, they are very important for good health and well-being.

The key link between diet, inflammation and eicosanoids is that the pro-inflammatory eicosanoids are derived from Arachidonic acid (AA), an essential LC-omega-6 fatty acid originating from plants, and the anti-inflammatory eicosanoids that are generated from Eicosapentanoic acid (EPA), an essential LC-omega-3 fatty acid originating mainly from marine sources. Normal diets are often pro-inflammatory containing more Omega-6 than Omega-3, and should be balanced by increased intake of anti-inflammatory LC-omega-3. The % LC-omega-6 of total LC-PUFA (LC-omega-3 + LC-omega-6) in whole blood provides a picture of the pro-inflammatory status of the diet.

Table 3 and Figure 3 show that Effektri added to the diet is effective in reducing the % LC-omega-6 of total LC-PUFA in whole blood independent of breed, thus reducing the dietary pro-inflammatory climate. The data also shows that most horses with reported physical problems have an elevated dietary pro-inflammatory climate in the whole blood. The exception being the Shetland pony Swift, who's problem may arise from other causes than fat metabolism.

Horse Name	Breed	Effektri	C20:3	C20:4, AA	C20:5, EPA	C22:5	C22:6, DHA	% LC-omega-6 of LC-PUFA	Comments
Esmee	Dutch warmblood	yes	0,2	1,0	0,6	0,1	0,2	57,1	
Game boy	Dutch warmblood	yes	0,0	1,1	0,2	0,2	0,4	57,9	
Gentleman	Dutch warmblood	yes	0,0	1,1	0,2	0,2	0,3	61,1	
Diva	Dutch warmblood	yes	0,3	1,3	0,6	0,4	0,0	61,5	
Cezzane	Dutch warmblood	no	0,3	1,0	0,2	0,2	0,2	68,4	
Enjoy	Dutch warmblood	no	0,2	1,4	0,7	0,0	0,0	69,6	
Carlos	Dutch warmblood	no	0,0	1,4	0,0	0,0	0,5	73,3	Problems of behavior, stomach problems and stiff muscles
Aliz	Dutch warmblood	no	0,4	1,0	0,3	0,1	0,0	77,8	Itchy skin
Harley	Dutch warmblood	no	0,5	1,5	0,0	0,0	0,0	99,5	
Maddy	New Forest pony	yes	0,0	1,7	0,8	0,4	0,4	51,5	
Florence	New Forest pony	no	0,4	0,8	0,4	0,0	0,0	75,0	
Floor	New Forest pony	no	0,0	1,0	0,0	0,0	0,0	99,0	Itchy skin - light summer eczema
Wimlex	NRPS	no	0,2	1,0	0,3	0,4	0,4	52,2	
Naomi	NRPS	no	0,0	1,2	0,5	0,5	0,0	54,5	
Ezra	NRPS	no	0,0	1,5	0,0	0,0	0,0	99,3	Tendon problem
Switch	Shetlander	no	0,4	1,0	0,6	0,4	0,2	53,8	Problems with the joints
Fred	Unknown	yes	0,7	1,6	1,0	0,3	0,5	56,1	
Jardo	Arabic mix	no	0,3	0,9	0,5	0,0	0,0	70,6	Unknown auto immune disease
Spook	Welsh A	no	0,0	1,3	0,4	0,0	0,0	76,5	
Bor	Haflinger	no	0,3	1,1	0,4	0,0	0,0	77,8	To fat

Table 3. Calculating the Pro-inflammatory Index from fatty acids composition of whole blood in horses.

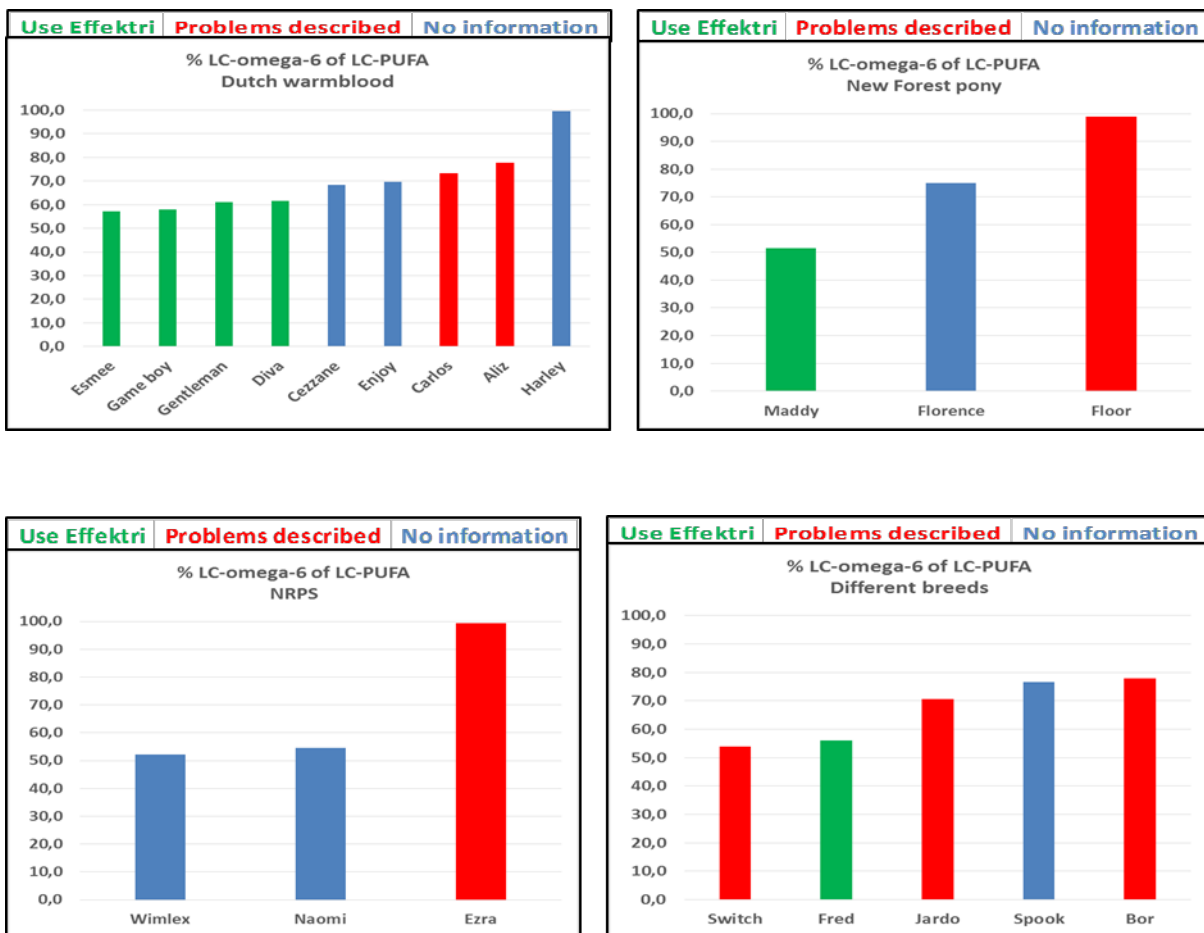


Figure 3. Pro-inflammatory Index for individual horses of different breeds taken from Table 3. Horses that are taking Effektri oil are marked green. Horses with known chronic lifestyle ailments are marked red.

## Recommendations

Horses are plant eating animals. When using Effektri oil to reduce, to restore or to maintain the dietary and pro-inflammatory indicators of fat metabolism, we need some extra information to be able to provide a correct recommendation for each horse. Thus, the horse owner, when retrieving the fatty acids analysis result by introducing his personal code onto [www.effebalance.fi](http://www.effebalance.fi) will be requested to fill in an online questionnaire providing information about the Horse name, Breed, Gender, Age, Weight, Condition, Exercise level and Known chronic lifestyle ailments (see Appendix 1).

To reduce, restore or maintain the dietary and pro-inflammatory indicators of fat metabolism, our Effektri oil recommendation is primarily based on the body weight of the horse, adjusted for 1) Exercise level, 2) Condition, 3) Known chronic lifestyle ailments, 4) Dietary indicator result and 5) Pro-inflammatory indicator result.

A basic daily intake of Effektri oil of 0.05 ml oil per kg body weight (= 25 ml for a 500 kg horse), provides 0.01 g LC-Omega-3 (EPA+DHA) per kg body weight from fish oil (= 5 g LC-Omega-3

for a 500 kg horse). The LC-Omega-3 are protected by 0.02 mg polyphenols from olive oil per kg body weight (= 10 mg polyphenols for a 500 kg horse).

Table 4 provides the ml Effektri oil recommendations for each of the 20 horses in our example. After treatment as recommended for 120 days, a new test may indicate improvements that may lead to reduced recommended daily maintenance intake of Effektri for life.

Horse Name	Breed	Gender	Age	Weight	Exercise	Known chronic lifestyle ailments	(SAFA+MUFA)/LC-omega-3	% LC-omega-6 of LC-PUFA	Effektri, ml
Divia	Dutch warmblood	Mare	8	600	No		62,5	61,5	33,7
Esmee	Dutch warmblood	Mare	7	550	Intensive		67,6	57,1	39,2
Game boy	Dutch warmblood	Gelding	5	550	Medium		77,3	57,9	36,7
Enjoy	Dutch warmblood	Mare	7	650	Medium		85,7	69,6	44,0
Gentleman	Dutch warmblood	Gelding	5	600	Medium	Not a shiney coat	86,6	61,1	43,4
Cezzane	Dutch warmblood	Mare	9	600	Medium		99,7	68,4	41,0
Carlos	Dutch warmblood	Gelding	9	700	Medium	Behavior, stomach and stiff muscles	113,1	73,3	52,0
Aliz	Dutch warmblood	Mare	11	600	Low	Itchy skin	144,5	77,8	42,7
Harley	Dutch warmblood	Gelding	4	650	Medium		6040,0	99,5	50,5
Maddy	New Forest pony	Mare	6	400	Intensive		37,8	51,5	27,8
Florence	New Forest pony	Mare	23	300	No		165,8	75,0	18,6
Floor	New Forest pony	Mare	15	400	Low	Itchy skin - light summer eczema	6630,0	99,0	31,0
Wimlex	NRPS	Mare	6	400	Intensive		55,4	52,2	28,2
Naomi	NRPS	Mare	5	420	Medium		62,2	54,5	27,7
Ezra	NRPS	Mare	8	400	No	Tendon problem	6110,0	99,3	29,0
Fred	Unknown	Gelding	6	600	Medium		31,4	56,1	38,6
Switch	Shetlander	Gelding	13	90	No	Problems with the joints	50,8	53,8	5,4
Jardo	Arabic mix	Gelding	11	450	No	Unknown auto immune disease	129,2	70,6	29,2
Spook	Welsh A	Gelding	5	200	No		146,3	76,5	12,2
Bor	Haflinger	Gelding	6	550	Low	To fat	155,5	77,8	39,4

Table 4. Calculating Effektri Health Concept recommendations for individual horses.

## Conclusion

Horses with reported known chronic lifestyle ailments have elevated dietary- and pro-inflammatory indicator in whole blood.

Effektri oil is effective in reducing the dietary indicator in whole blood independent of breed, providing flexibility and functionality to cell membranes.

Effektri oil is effective in reducing the pro-inflammatory indicator in whole blood independent of breed, thus reducing the dietary pro-inflammatory climate.

## References

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## Appendix 1 – Effektri Online questionnaire

Horse

Dog

Name: .....

Age: .....

Gender: .....

Breed: .....

Nationality: .....

Weight in kg (estimation): .....

Use of Effektri:  Yes  No

### Exercise:

No  Low  Medium  Intensive

### Animal's condition:

Too skinny  Skinny  Good  Heavy  Too heavy

### Known chronic lifestyle problem:

Joints  Coat  Stomach  Tendon  Muscles  Immune system  
 Allergy  Respiratory system  Particularities/other

Explain Particularities/other: .....