FLECKVIEH WORLD

The magazine for Fleckvieh breeding

BAVARIAN FLECKVIEH GENETICS
BAYERN GENETIK

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Index

BAVARIAN FLECKVIEH GENETICS

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♦ **Namibias President Hifikunye Pohamba (right) presented the highest trophy of the Cattle Show in Windhoek to Kaspar Günzel (center) and his sons Hinner and Friedhelm for an extraordinary Fleckvieh cow.**

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The Fleckvieh-World is real!
The cattle photos published in the Fleckvieh-World are not retouched. Cattle that are photographed are only allowed to be shared, washed and treated with oil, powder and gloss spray.

Cover:

♦ **Perfectly pigmented Fleckvieh beef cow with calf a foot in the Saxony Freestate. (Photo: Schuhmann)**

Dear Fleckvieh breeders, dear customers and friends of Bavarian Fleckvieh Genetics

With lots of enthusiasm we started into the year 2013!
Our first project was a big Fleckvieh show in Miesbach where we presented our ideas of „modern Fleckvieh breeding“. This event was very important for us, because fewer and fewer breeders have a precise idea of how our breed should look like. They don't think about type traits anymore and genomic selection forces this development also because it is based only on figures.
And yet it is very easy to define and show the type traits of our breed! Thousands of farmers give us valuable tips which mistakes we should avoid in our daily breeding work. Furthermore we can learn from our high-production herds how an efficient, long-living and robust Fleckvieh cow should look like.
As an universal breed, Fleckvieh can accept any challenges of the future. We all know about the milk and beef production capacity of Fleckvieh. However, we still don't know too much about the quality traits of milk and beef produced with Fleckvieh. Why do top chefs praise the taste of Fleckvieh beef? Why do cheese makers need only 8,4 liters of Fleckvieh milk to produce 1 kg of cheese compared to 10-11 liters of milk from other breeds?
Bavarian Fleckvieh Genetics decided to address these questions, because we are convinced that in future milk is paid for quality, not only for quantity. This years' Fleckvieh Weekend at Aschau/Chiemgau is the beginning of an information campaign we started to make breeders and consumers aware of the unique quality of Fleckvieh products. During the Fleckvieh Weekend local Fleckvieh farmers present their products on mountain huts and chefs will cook with Fleckvieh beef and milk for us. We are looking forward to this event.

In order to provide you with scientific proofs for the unique quality of Fleckvieh products in this issue of the Fleckvieh World we share with you the results from studies which we initiated or even financed.
We know that we are blessed to work with a special breed. Let's discover and spread the „secret strengths“ of Fleckvieh together in order to extend the relationship between consumers and breeders.
Our dream is a „Fleckvieh“-label on all Fleckvieh products. Other breeds already successfully boosted their marketing with brands. Why shouldn't we try this, too?
Any suggestions how we can improve the promotion and marketing of our breed are always welcome! Don't hesitate to contact us!

Yours sincerely

Dr. Thomas Grupp
CEO

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Sweden
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South Africa
Namibia
Canada
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North. Ireland
Great Britain
Mexico
Peru
Brazil
Australia
New Zealand
China
Russia
Belgium
Italy
Ukraine
Croatia

The Milk and Beef of Fleckvieh cattle are of superior quality!

In general, Milk Processors are currently paying dairy farmers for milk volume, components and milk quality i.e. cell count, but are reluctant to reward suppliers for certain characteristics such as protein variants or content of special fatty acids. Almost no abattoir pays a premium for grass fed slaughter cattle, so why should we consider certain components of milk and beef that we do not yet get paid for?

As a producer of food it is important to supply what the consumer wants and today the consumer is becoming more health conscious, interested in food safety, environmentally aware and responsible, he enjoys quality food and wants to have the convenience to readily purchase the product. Consumers are more and more interested in naturally produced, unprocessed foods. Why not follow this trend and promote naturally produced Fleckvieh products with added value?

Fleckvieh as a balanced dual purpose breed has a great potential to be associated with all things natural, therefore in future, we have to place more emphasis on the promotion of the health benefits and the naturalness of Fleckvieh products, in order to take advantage of this unique selling proposition!

Influence of Feed

As the cost pressure on producing agricultural products is rising, it is necessary to think about lending an additional benefit to milk and beef. There are several possibilities to influence the quality of cattle products. Of course, one of them is feeding. Some dairies in the Alpine region for example already market products from milk of cows that are only fed with hay and grass. They promote their products as „Hay Milk"- products that are naturally enriched in CLA. Compared to products that are made of milk from silage-fed cows, the CLA content of „Hay Milk" products is much higher. But also in other areas farmers feed their cows a grass based ration with as little corn silage and concentrate as possible and found that the milk they produced also had had a higher level of CLA.

♦ **Holzmichl-daughter in Upper Bavaria.**

An animal's diet can have a profound influence on the composition and nutrient make up of its products.

Influence of Genetics

Some of the quality traits like A2 and Kappa-Casein are genetically determined. This means that the composition of a product depends on the genetic constitution of an animal. In this case farmers should select their cattle according to the favored traits in order to get the desired nutrients in the milk.
Thus it becomes obvious that it is possible to add value to Fleckvieh Milk and Beef through a natural, thought-out production system without any industrial processing or additives. We should take advantage of the excellent genetic constitution of Fleckvieh and promote the superiority of its products to the public.
However, a lot of research is still needed to find out which nutrients produced by ruminants are important for humans and how their content is influenced by genetics or feeding. For some nutrients there seems to be great differences between breeds and we try to find out what the results of Fleckvieh are and where we eventually can influence the content of favorable nutrients through genetics and a careful and directed selection of our bulls. Bavarian Fleckvieh Genetics supports several studies both financially and in practice to find out more about the potential of Fleckvieh. We are engaged for example in a study at Elsenburg / South Africa to find out about the CLA and Omega 3/6 content of milk and beef produced with Fleckvieh and Fleckvieh crossbreds (Fleckvieh x Jersey) that are grazed on pasture.
Bavarian Fleckvieh Genetics tests its sires for several important milk traits such as A2 and Kappa-Casein or beef traits like marbling and tenderness. We publish the results with every bull tested and we also recommend bulls that are especially well suited for Pasture grazing systems or Organic farming.
Our clients can choose from a broad variety of sires which best fit their production requirements, climate and special needs.

A word on Genomic selection

We are convinced of the natural strength of the Fleckvieh breed and therefore are a little skeptical about the emphasis being placed on genomic selection.
We follow the development with some concern, because in our opinion, in some cases, the focus is set on the wrong traits. We are afraid that we will lose important traits when we concentrate on traits like milk yield or

♦ **High quality products can be made from Fleckvieh milk.**

beef yield. Therefore, when buying in new bulls we still pay great attention to type traits, pigmentation and cow families. In our opinion a sire should still be thoroughly progeny-tested before he is used on a larger scale.

Environmental awareness

Dairy production with the dual purpose breed Fleckvieh has several advantages for the consumer. The most important point certainly is that it stands out through a superior product quality, but Fleckvieh as a dual purpose breed is also very well suited to fulfill the demands of animal welfare and as the animals do not go to the extremes; neither as far as milk production nor beef production is concerned. The breed is climate friendly and moreover ideally suited for the preservation of cultivated landscape. This, of course, is primarily important for the tourist regions like the Alps and other rural areas, where often, grazing cows have an adverse impact on the natural scenery. In order to preserve the countryside of certain districts we have to keep cultivating the grassland. The grassland also is a manifold bio-diversity for animals and plants. The grassland and pastures have been cultivated and conserved for centuries through the continuous cultivation and preservation by humans. These areas, cultivated for centuries often attract tourists and people seeking recreation. Through grazing our cattle and feeding them with grass rather than too much corn and concentrate we can contribute to the preservation of the natural, beautiful landscape and the bio-diversity. Fleckvieh cows are excellent feed converters that can produce a lot of milk and beef from basic pasture feed and thus are ideally suited for grazing or grass based rations.
It is important to promote all these advantages of Fleckvieh to the consumer and make them aware of the many positive qualities Fleckvieh has to offer!

Some dairy plants are already changing their mindset and offer the farmer with financial rewards for cheese yield or certain other favorable contents or feeding regimes, with consumers willing to pay the premium for the product. In order to be part of these developments, producers need to think ahead of the times and should reconsider their breeding strategies in the early stages of the programme. When decisions are made to change breeding strategies it can take years to see dividends, as genetic change is a long term process. So it is always better to start early and will not be detrimental to the breeding programme, as they say „nothing ventured, nothing gained".

A2 milk – What is it all about?

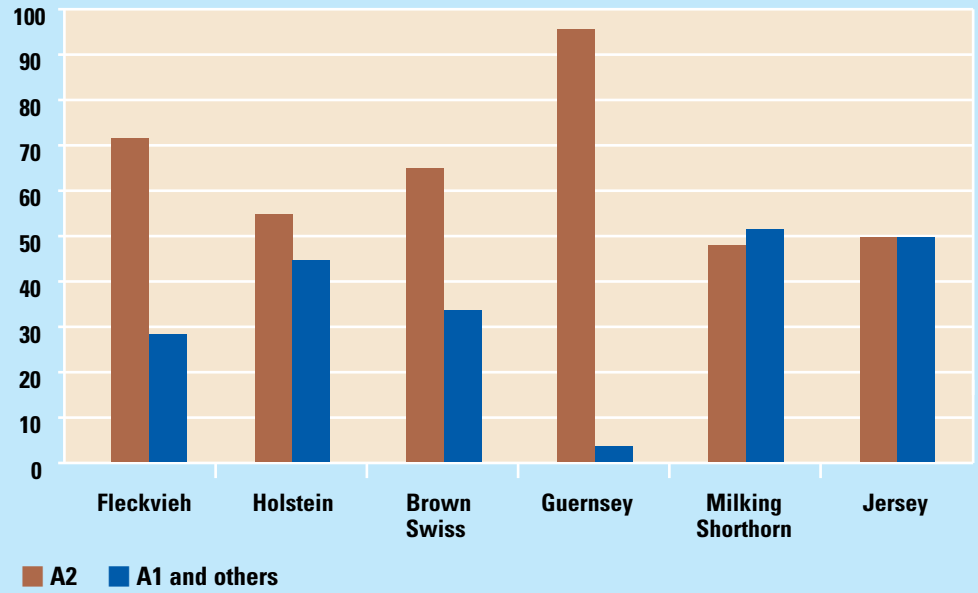
Generally cow milk is regarded as food with a high nutritional value. Over recent years, however, scientific evidence has linked certain milk components to a variety of health issues.

Besides water and fat, milk contains proteins. Most of these proteins belong to the so called caseins. There are different types of caseins, one of them is beta-casein.

A1 and A2 beta-casein are genetic variants of the beta-casein milk protein with different chemical structures. Although they differ only by one amino acid, the A1 protein digests differently to the A2 protein in the human intestinal tract. A cow is capable of producing either the A1 type, the A2 type or both, A1 and A2, depending on her genetic constitution. Research done in several countries has suggested that there might be a link between the consumption of A1 milk to diseases of modern man like diabetes, cardiovascular diseases, autism and schizophrenia. However, these theories are based on statistical correlations, animal research or anecdotal reports. Nevertheless, the health conditions that have been postulated to be affected by the A1 beta-casein content of milk are important and reasonably common. Therefore, if the composition of milk is a causative factor for these conditions, it has major public health implications.
The most common type found in cow's milk in Europe, the US, Australia and New Zealand is the A1 beta-casein type. The A2 form of beta-casein is estimated to be the original form of beta-casein that would have been produced by cows thousands of years ago.
At some point in history, owing to natural genetic mutation, the A1 form appeared in dairy cattle and was spread throughout dairy herds across Europe, beco-

♦ Image 1:

Allelic frequencies of β-Casein genotypes of different breeds



	Fleckvieh	Holstein	Brown Swiss	Guernsey	Milking Shorthorn	Jersey
A2	71 %	55 %	66 %	96 %	49 %	50 %
A1 and others	29 %	45 %	34 %	4 %	51 %	50 %

Source: Milk Protein Polymorphisms in Califonia Dairy Cattle, Journal of Dairy Science, Volume 74, Issue 5, May 1991 and Comparison of Influence Markers CSN3 and CSN2 on Milk Performance Traits in Czech Spotted and Holstein Cattle tested at first, fifth and higehr lactation, Nitra, Slovaca Universitas Agriculturae Nitriae, 2006.

ming the common form of beta-casein in many breeds of cows. Traditional cattle breeds such as Zebu, the native Asian cattle and closely related animals such as the Water Buffalo and Yak all still only produce the A2 type of beta-casein.

A2 in Fleckvieh

Fleckvieh has a high percentage of A2 milk, which is supposed to be the „good" type. Studies done to date in 10 countries and across 7 dairy breeds between 1982 and 2006 show, that Fleckvieh had the 2nd highest frequency of the A2 beta-casein protein of all breeds after Guernsey. Six studies included Holstein, three studies included Jerseys and one study each one Ayrshire, Guernsey, Brown Swiss, Milking Shorthorn and Fleckvieh.
The Fleckvieh study was published in the Czech Journal of Animal Science in 2006 and was conducted on 440 animals of the Czech Fleckvieh Breed. Of the 440 Fleckvieh animals tested:

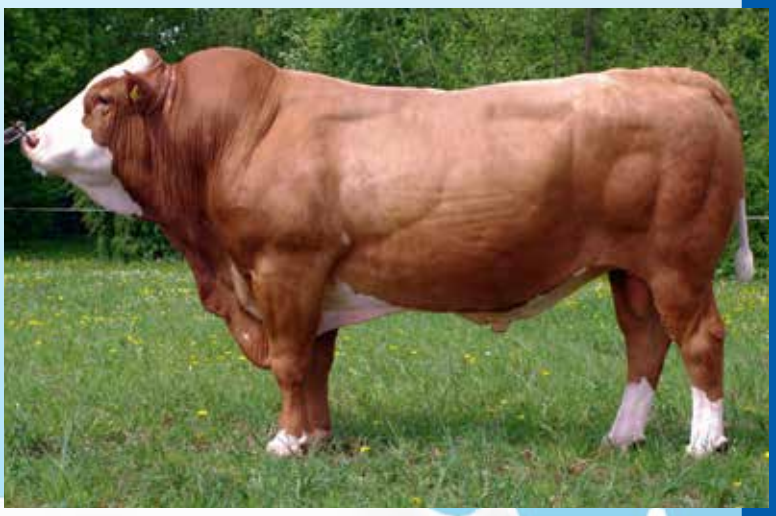
67 %	tested A2A2
30 %	tested A1A2
3 %	tested A1A1

The graph on page 8 shows results on tests done to date to compare between breeds and from it can be seen the high incidence of A2 beta-casein gene in Fleckvieh.
The scientific results obtained to date are very promising for Fleckvieh. Should the additional health benefits of A2 milk prove true, this would be another big advantage for Fleckvieh.
A2 milk is already being sold in Australia, New Zealand, the US and the UK and it is attracting more and more interest from the health conscious consumers. However, further research is needed before there is a definitive answer to the benefits of drinking A2 milk. If the A1/A2 hypothesis is proved correct, changing dairy herds to more A2 producing cows may significantly improve public health. In the mean time A2 milk is highly unlikely to do harm and therefore the idea of using A2 bulls to eventually change the herd to A2 one day is definitely worth considering.

As a result of all this interest, Bavarian Fleckvieh Genetics began to test their bulls to find out whether they carry the 'desirable' A2 gene. Here is the list of bulls that are homocygous A2:

Valuta	10/188933
Rosskur	10/179513
Mangope	10/188528
Romty	10/172695
Ralmes	10/170336
Ilion	10/185090
Mercator	10/172474
Wallenstein	10/192421
Malsaf	10/189159
Holzmichl	10/192011
Sylt	10/179031
Haertsfeld	10/188759
Hagwirt	10/192627
Zasport	10/172305

Three bulls that carry the desired A2 alleles:



♦ **Haertsfeld 10/188759**

♦ **Rosskur PS 10/179513**

♦ **Wallenstein 10/192421**

A2 milk – Fact or Fiction?

♦ George Cassar, Australia

Since the publication of Keith Woodfords book, „The Devil in the Milk" in September 2007, there has been a growing awareness to the claimed benefits of drinking milk containing only the A2 Beta Casein protein. This awareness also stems from the exposure by the media and many positive comments and testimonials by users of A2 milk.

In Australia, A2 milk is marketed through the A2 Corporation and commands a premium price. It sells for around $3.95 for 2 Litres, with other branded milks like „Dairy Farmers" retailing for about $3.65 for 2 Litres and Supermarket „Home Brand" milk selling for $2.00 for 2 Litres. Even with this premium price, A2 Milk sales now claims a 6.8 % market share of all fresh milk sold in supermarkets and stores in Australia. Sales of A2 milk now exceeds the combined total of all organic, lactose free, goat, and soya milks. This has helped to raise the profile of milk as a quality product and is also helping the dairy farmer, as a premium gate price is also passed on to the producer, which ensures the viability of the dairy farm.

As a result to the interest surrounding the benefits of drinking A2 milk, more and more health professionals, including doctors and nutri-

♦ **Rosskur-daughter Lilli.**
Production: 1. La, 100 days:
2.952 kg milk – 3,51 % butterfat – 3,16 % protein.

tionists are prescribing A2 milk to sufferers of milk intolerance conditions. Whist currently there is no Scientific studies proving beyond doubt that there are health risks involved with drinking A1 milk, it is the consumer that is doing the talking, with sales of A2 milk increasing tenfold over a 5 year period from September 2007 to June 2013 and a doubling of sales in the past 18 months.

The following is a testimonial and is typical of what users of A2 milk have to say:
„When my son was born he had a very immature gut. He suffered from griping pains and colic which was why I continued to exclusively breastfeed him for as long as possible. When he was around 6-12 months old, I started to slowly introduce him to solids, pureed vegies, fruit, yogurt and an occasional drink of cow's milk. He seemed to handle the fruits and veggies quite well but when it came to all dairy products he suffered from stomach pains and the occasional episode of constipation. I took him to the doctors to make sure that he wasn't lactose intolerant or had any dairy allergies and all the tests came back negative. So as a last resort I was recommended to try A2 milk from another mum who has twin boys, both suffering from lactose intolerances. I tried it with my son and he absolutely loved it. He easily digests it, loves the taste and now never gets stomach pains and he drinks it by the bottle. I would and do recommend it to anyone".

♦ Kelly Burke, Australia

♦ **Rosskur-daughters carry at least one allele of the „desirable" A2 gene since Rosskur PS is homocygous for A2.**

♦ **Rosskur-daughter Zyprese.**
Production: 1. La, 100 days: 2.712 kg milk – 4,16 % butterfat – 2,99 % protein.

♦ **The Kappa-casein variant of the milk has a great influence on the renneting time and curd firmess.**

♦ **The BB genotype appears to be the most favourable for cheese production.**

Important milk components for cheese making

Kappa-casein and Beta-lactoglobulin

Kappa-casein is a key protein in the cheese making process, as the Kappa-casein variant of the milk influences the renneting time and the curd firmness. The cheese production properties of milk are the better, the shorter the renneting time is and the firmer the curd gets.

In the cattle population there exist several variants of kappa-casein. The genotype of a cow determines the kappa-casein variant she produces in her milk. The percentage of Kappa-casein in the milk does not only differ between breeds, but also between individual animals, depending on their genotype.

Basically there are three possible gene combinations in a cow for Kappa-casein: AA, AB and BB. The BB genotype appears to be the most favorable for cheese production. Studies have shown that the cheese yield can be improved substantially with BB milk compared to AA milk and also the renneting time is shorter.

Possible Kappa-casein genotypes

BB: preferred genotype for milk production

AB: Intermediate for cheese production

AA: Least favorable genotype for milk production

Unfortunately the BB genotype of the Kappa-casein is not yet so common among the Fleckvieh breed. Studies have shown that only 43% of the Fleckvieh cows have either the genotype BB or AB, the rest is AA. This is definitely a trait Fleckvieh breeders have to work on and Bavarian Fleckvieh genetics is trying hard to support you with this.

♦ **The cheese making properties of milk will gain more and more importance in the future.**

Beta-lactoglobulin

In the end, the cheese yield does not only depend on the whole protein content of the milk, but on the casein content, which is measured by the casein number.

Therefore it is also necessary to mention the Beta-lactoglobulin genotypes which are determining the casein number of the milk. The casein number of the milk indicates the percentage of casein of the whole protein fraction and is the other key factor for cheese making.

The percentage of casein from all proteins in the milk (casein number) is 77 % in average. The Beta-lactoglobulin genotype BB is correlated with a higher casein number as the genotypes AB and AA. Studies showed that 26% of the Fleckvieh cows have the genotype BB and 49% the genotype AB. The importance that is attached to the Kappa-casein and Beta-lactoglobulin genotypes of cows varies from country to country. In some countries like Italy for example the Kappa-casein genotype of a bull plays quite an important role in the selection of breeding bulls.

Although many cheese makers already prefer Fleckvieh milk to the milk of other dairy breeds, these cheese making characteristics/ traits should be something we should work harder on.

Especially reports from the Parmesan manufacturing area in Italy show very promising results.

♦ **Ilion carries the AB allele for Kappa-casein and Beta-lactoglobulin.**

♦ **Heavily used sires like Round Up spread favourable genes in the Fleckvieh population (Round Up Kappa-casein genotype: AB)**

More and more farmers use Fleckvieh for high quality cheese production

Top quality organic cheese production in Italy – Parmigiano Reggiano PGI

♦ Dr. Martino Ermacora, Associazione Allevatori del Friuli, Venezia, Giulia, Italy

The knowledge on the advantages of Fleckvieh is spreading in Italy. Many farmers switch from Holstein and Brown Swiss to Fleckvieh every year because of the higher profitability of the dual purpose breed. Besides strong cows, bull calves for fattening and excellent carcasses, the milk quality is highly appreciated.

The excellent cheese making qualities of Fleckvieh milk make it ideally suited for the production of quality PGI (Protected Geographical Indication) cheese such as Parmigiano Reggiano, Grana Padano, Montasio or Castelmagno for example.
Hombre is the name of a farm and dairy in Modena, where more than 300 cows are milked every day. Most of the cows are Holsteins, but since 6 years red and white muscled Fleckvieh cows bring colour into the herd. Mr. Cesare, the herd manager states: „The quality of Bio-Hombre organic Parmigiano Reggiano PGI starts with the cultivation of the farmlands, all together 300 hectares. The crops are chosen according to the needs of the milk-producing livestock. The rotation method is simple and based on just a few crops: alfalfa, which covers about 50 % of the farm land, corn, barley, soy bean and peas. All the crops are cultivated with natural methods. Absolutely no chemicals are used - neither for weed control, nor as fertilizers." When we start speaking about cattle he says:

„For more than 20 years we focused particularly on Holstein genetics in order to improve the animals' morphological characteristics as well as milk production. We reached the target, the milk quality is excellent. But over the years, the strength of Holstein decreased. Lower fertility, lots of cows culled because of diseases and injuries. All our animals are treated solely with homeopathic methods to ensure that no drugs (such as antibiotic) find their way into our milk. It was becoming too much complicated."

Six years ago they decided to switch and bought 120 Fleckvieh heifers from Friuli (Italy), Southern Tyrol (Italy) and Bavaria (Germany). Mr. Cesare talks enthusiastically about Fleckvieh: „They are strong, healthy, trouble-free and can easily compete with the bigger Holsteins in the herd.
For cheese production we tried also a small group of 15 Montbeliarde heifers a couple years later, but most of them already left the herd. The milk is okay, but they are not strong enough and you can't realize additional income as you can with Fleckvieh.

♦ **The diet of the cows is a cruial factor in the production of good cheese.**

This QR-code leads you to a video about Bio-Hombre farm and shows you how they make their „Parmigiano Reggiano".

Of course, a cows' diet is a crucial factor in the production of good cheese, but we feel that the milk quality of Fleckvieh is enhancing the taste and flavor of our Parmigiano-Reggiano PGI."
„With Fleckvieh, the quality of the curd and the renneting time improved, which are crucial factors for cheese production and we strictly take care about it. Our dairyman always says that cheese is not just milk and milk is not just percentage of proteins or caseins, it's a lot more! Fleckvieh has that „plus", and Fleckvieh milk will conquer more and more space in the cauldrons of the dairies in our area".
The cheese production is done according to the Consortium's strict regulations. Milk from the evening milking is poured straight into the floating tanks in the farm's dairy. It stays there until the following morning when it is skimmed and added to the full-cream milk from that morning's milking. The process takes place in the same double-bottomed copper cauldrons that are used for both, the production of the milk and its subsequent transformation into Parmigiano-Reggiano PGI. Every day 7.000 liters of milk are processed to produce a total of 14 „wheels" of cheese. The wheels are then taken for salting which lasts around 18 days and finally, left to ripe for 24 months or more.
„Every 15 days the wheels are cleaned and checked to ensure the cheese rips perfectly, and with Fleckvieh milk it works 100 %".

♦

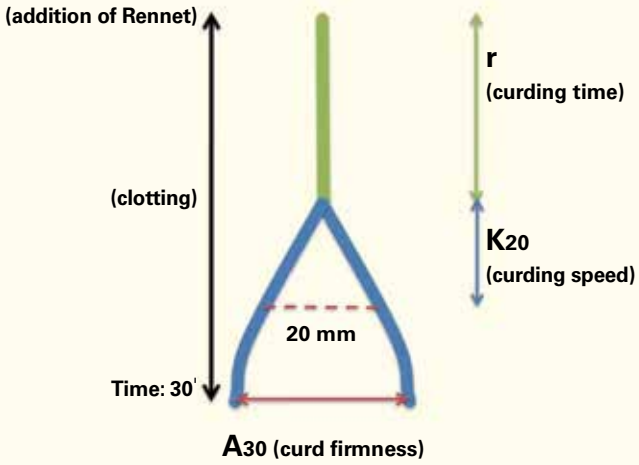
Lactodinamography

The aptitude of milk to be transformed into cheese can be measured with a Lactodinamograph, a complex machine invented in the last century to evaluate curd quality parameters: curding time, curding speed and curd firmness. The milk is poured into cells that are inserted in a heating unit at 35 ° C and then rennet is added.
Small stainless steel pendulums are immersed in the milk sample and made to oscillate horizontally.
The movement of the pendulum is captured by mirrors and regularly photographed on a paper which flows at a speed of 2 cm per minute.
The formation of gel and then the increase of viscosity determines displacements of small entity on the position of the pendulum, the range of motion of the pendulum generates characteristic bell-shape paths used to evaluate the cheesemaking aptitude of milk.
Today the Lactodinamograph can be quickly simulated by computer with sufficient average reliability and lower costs. Geneticists are already working on calculating the heritability of the cheesemaking qualities of milk, in that way they hope to get a closer look to it rather than only through protein percentage and casein variants.

♦

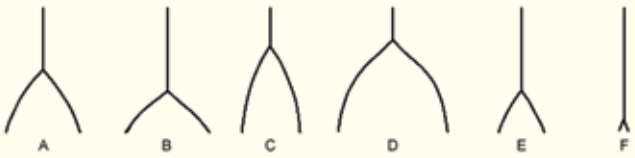
♦ Image 1:

Explaination of Lactodinamographic path



♦ Image 2:

Typical bell-shape paths



♦ Table 1:

Explanation of the bell-shape paths used to evaluate the cheesemaking aptitude of milk

Lactodinamographic parameters	A	B	C	D	E	F
Curding time **r** (min')	Normal	Slow	Fast	Very fast	Slow	Very slow
Curding speed **k20** (min')	Normal	High	Slow	High	Slow	Very slow
Curd firmness **a30** (mm)	Normal	High	Weak	Very high	Low	Inhexistant
Attitudine	Optimal	Good	Fair	Good	Poor	Unsuitable

Type A: optimal milk
B: tipically milk of the end of lactation. Slow curding time but high firmness
C: tipically milk of the beginning of lactation. Fast curding time but low firmness.
D: high casein or slightly acid milk. Fast curding, very strong firmness
E: milk with high SCC or low acidity poor casein content. Very low reactivity to rennet. Poor firmness
F: Tipically mastitic milk, very low acidity (residual of antibiotics in milk). Unsuitable for cheese production

Not everything depends on genetics – some factors are also influenced by feeding!

More and more farms in the alpine regions of Germany, Austria and Switzerland are now producing what is called „Hay Milk". The term „Hay Milk" describes milk produced from cows that are fed grass during summer and hay during the winter.

♦ **The milk of grass-fed cows has a higher CLA content.**

What is the idea behind that? Not only do these products taste better, but it also satisfies the demand by consumers for healthy, naturally produced food.

Several studies have shown that the milk fat produced of grass and hay fed cows has a significantly higher content of polyunsaturated fatty acids than the milk fat of cows that are fed silage and lots of concentrate.

Milk fat, like vegetable oils and coconut oil, is composed of fatty acids. Milk fat contains about 400 different fatty acids and has the most complex fatty acid composition of all edible fats.
Recently, two fatty acids in particular, have attracted the notice of health conscious consumers: CLA (conjugated linoleic acid) and the Omega-3-fatty acids. Both belong to the class of unsaturated fatty acids that are supposed to be the physiological most important fatty acids and to have several positive effects on human health.
The fatty acids in milk fat come either directly from forage or the fat tissue of the cow, or are synthesized from the rumen bacteria or in the mammary glands. Several studies have shown that with pasture based feeding combined with a deliberate reduction of concentrates and a ration without corn silage, it is possible to improve the content of Omega-3-fatty acids and CLA in the milk.

Omega-3

Omega-3-fatty acids are considered essential fatty acids. This means that they are necessary for human health, but the body can't make them – you have to get them through food.

Important health benefits of the Omega-3-fatty acids are:

- They lower total cholesterol and triglycerides in people with high cholesterol levels
- They reduce inflammation and may help to lower risk of chronic diseases such as heart disease, cancer and arthritis
- They appear to prevent and treat arteriosclerosis (hardening of the arteries) by slowing the development of plaque and blood clots, which clog the arteries

The content of Omega-3-fatty acids in milk is quite low compared to the whole fat content of milk. But since milk plays an important role in human nutrition, milk fat provides an important share (20-30 %) of the total dietary intake of Omega-3-fatty acids.
Another important fact is that excessive amounts of omega-6 fatty acids (another essential fatty acid) and a very high omega-6/omega-3 ratio, as is found in today's Western diets, promote the pathogenesis of many diseases, including cardiovascular disease, cancer, and inflammatory and autoimmune diseases, whereas increased levels of omega-3 fatty acids (a low omega-6/omega-3 ratio) exert suppressive effects. Therefore the more Omega-3-fatty acids a product contains, the more beneficial it is.
Several studies conducted all over the world showed that milk from grass-fed cows has an elevated level of Omega-3 fatty acids and thus can contribute to a healthy diet.

CLA

The primary sources of CLA in the human diet are meat and dairy products from ruminant animals. About 75 % of CLA intake in most countries comes from milk and other dairy products; most of the remainder comes from meat.

The benefits of CLA are:

- Protection from cancer
- Reduction of the LDL-cholesterol

From crossbreeding research being conducted at Elsenburg / South Africa, it seems that Fleckvieh x Jersey cows on pasture based diet have higher levels of CLA in their milk than purebred Jersey cows. A second study showed that Fleckvieh x Holstein cows have a 6 % higher CLA level in their milk than purebred Holstein. Trials done in Canada showed that the CLA levels in the milk of Fleckvieh x Holstein cows were higher than that of Holstein milk receiving similar diets.

One can assume that the content of CLA in the milk might be genetically determined. Bavarian Fleckvieh Genetics is at the forefront of this research and are actually sponsoring the scientific trial at Elsenburg to determine whether Fleckvieh cows naturally have a higher CLA content in their milk than other breeds of cows.
In order to take advantage of the positive effects of Omega-3-fatty acids and CLA on human health, it is important to maximize the content of these fatty acids in the ruminant products. Although milk and milk products can not cover the recommended daily amount of Omega-3-fatty acids and CLA, they can contribute considerably to an increase of the intake of these fatty acids.

The Alpine Paradox

Swiss researchers found that milk produced on alpine pastures had a significantly higher content of unsaturated fatty acids than „normal“ milk. They postulated the so called „Alpine Paradox“ which describes the lower mortality rate through coronary heart diseases in alpine regions based on a higher intake of alpine cheese. These Swiss researchers explain the paradox with the favorable composition of the fatty acids in the milk the alpine cheese was made from: Alpine cheese has a significantly higher content of Omega-3-fatty acids than cheese that was produced from milk from other areas. The Omega-3-fatty acids are precursors for substances with anti-inflammatory and antihypertensive effect. These results can be transferred to all milk produced on a grass or hay based ration.

The milk fatty acid composition and conjugated linoleic acid content of Jersey and Fleckvieh x Jersey cow milk in a pasture-based Feeding system

Fatty acid composition of Fleckvieh x Jersey cow milk

♦ C.J.C. Muller[1], B. Sasanti[2,3], S. Abel[3] and A. Schmulian[2]

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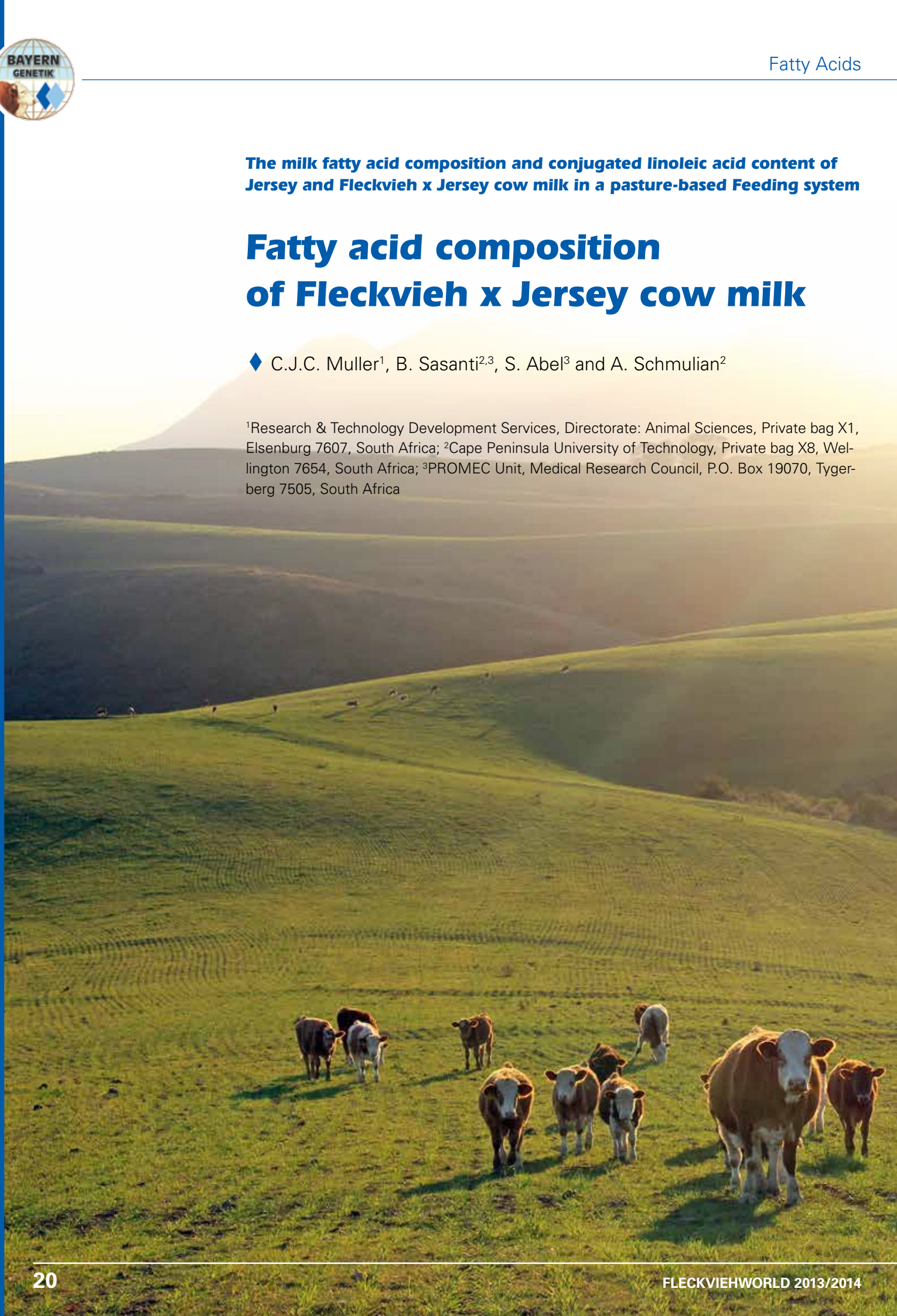


Summary

A number of fatty acids like omega-3, omega-6 and conjugated linoleic acid (CLA) present in the milk from dairy cows are considered beneficial nutrients for humans. The aim of the study was to compare the milk fatty acid (FA) content, particularly the CLA, omega-3, omega-6 FA content of the milk fat of Jersey (J) and Fleckvieh x Jersey (FxJ) cows in a pasture-based feeding system. All cows were fed the same diet consisting of kikuyu-ryegrass pasture supplemented with a standard concentrate mixture at 7 kg per cow per day. Four to five milk samples were collected every five weeks from 10 days after calving (DIM) up to 175 DIM. In addition, two further samples were collected every five weeks from 240 DIM to the end of the lactation. All milk samples were collected at the evening and the next morning's milking and pooled for each cow. Samples were kept frozen at -20° C until laboratory analysis by gas liquid chromatography. Thirty six FAs were detected and concentration levels determined. All milk samples (128 for J and 239 for FxJ) were used to compare breeds for FA content. Total omega-6 and total CLA differed ($P < 0.01$) between breeds being 1.571 ± 0.040 and 1.754 ± 0.029 and 0.630 ± 0.023 and 0.740 ± 0.018 g per 100 g milk fat for J and FxJ cows, respectively.

For both breeds the CLA content of the milk fat showed a curvilinear increase with lactation stage possibly indicating a standard sampling time to determine cow differences for genetic merit analysis. Further studies are required to determine the milk FA composition in different milk products.

Introduction

The fat component of milk has for many years been regarded as unhealthy because of its affect on heart diseases in humans (Salter 2005). Health practitioners recommend that the fat content of the human diet be reduced for protection against cardiovascular diseases and some forms of cancer. This has resulted in the popularity of fat free and low fat milk (0 and 2 % fat respectively) as well as low fat cheese and yoghurt products. However, the fat in milk is made up by a large number of saturated and unsatura-

♦ Fleckvieh and Fleckvieh x Jersey heifers near Heidelberg/ Western Cape.

ted FAs each contributing differently to the health of people. Bovine milk is increasingly being recognized as an important source of energy, high-quality protein, and essential minerals and vitamins (Heaney 2000 and Neuman et al. 2003). The fat in milk has recently acquired an improved status as new research has shown that some FAs have a beneficial effect on the health status of people. It is especially omega-3 FA and conjugated linoleic acid (CLA) that have anticarcinogenic, antidiabetic and antidipogenic effects. The amount of CLA in cows' milk is affected mostly by their diet and healthy FAs increase when cows are on pasture (Mitchell & McLeod 2008) or when feeds such as extracted soy beans and cottonseed are fed (Collomb et al. 2006). While diet has a major influence on milk fat CLA (Chilliard et al. 2001), the effects of factors such as breed, stage of lactation and parity on the CLA content in milk fat have received little attention (Kelsey et al. 2003). Some studies indicated breed differences in CLA content (Lawless et al. 1999) with Montbéliarde having 13 % greater CLA content in milk fat in comparison to Irish Holstein/Friesian, Dutch Holstein/Friesian and Normande. Large differences are observed among individual cows receiving the same diet (Kelsey et al. 2003). Crossbreeding is a means to overcome some breeding problems like fertility and longevity in some dairy breeds (Funk 2006). Recently, attention has been given towards using dual-purpose breeds in crossbreeding programmes to increase the beef production of crossbred animals while maintaining the milk yield of cows. The Fleckvieh, a Simmental-derived breed from Germany is one such breed. A study in Canada has shown that the milk from Fleckvieh x Holstein cows produced more CLA than purebred Holsteins under similar feeding conditions (Patrick et al. 2000, Lock & Bauman 2004). The aim of the paper was to compare the milk FA content of the milk of J and FxJ cows in a pasture-based feeding system.

Material and Methods

Location and Animals

This paper was based on an on-going breed comparison at the Elsenburg Research Farm of the Western Cape Department of Agriculture (Muller et al. 2009). Elsenburg is situated approximately 50 km east of Cape Town in the winter rainfall region of South Africa. The area has a typical Mediterranean climate with short, cold, wet winters and long, dry hot summers. To create two comparative pure- and crossbred dairy herds, all available J cows (n = 46) were divided into two groups according to estimated breeding value for milk yield. Groups were randomly allocated to be inseminated by J or F bulls. During the following lactation period cows were inseminated with the alternative sire breed. The progeny born from the J and F sires were further inseminated with the same breed. Subsequently, the production performance of J (n = 56) and FxJ (n = 64)

cows and their progeny was compared in a partly pasture-based feeding system. This consisted of mostly kikuyu pasture supplemented with a commercial concentrate mixture at 7 kg per cow per day regardless of milk yield and lactation stage. During winter the pasture was supplemented with a mixture of oats and lucerne hay. Fresh drinking water was freely available at all times.

♦ **The Fleckvieh influence can be easily seen in the calves out of pure Jerseys.**

Milk sample collection and analysis

Milk samples for FA analysis were collected and recorded every five weeks according to milk recording procedures. At each milk recording event, milk samples were collected from cows of both breeds. Milk was sampled from 10 days after calving (DIM) to about 175 DIM (milk tests 1 to 5) and thereafter from 240 DIM (milk tests 7 to 8). Milk samples were collected at the evening and next morning's milking session and combined. Milk samples were kept frozen at -20° C until laboratory analysis. Fatty acid composition of milk samples was obtained by gas liquid chromatography at the PROMEC Unit of the Medical Research Council. Thirty six FA were detected and concentration levels determined.

♦ **Dryland pastures are ideal for young crossbreds in South Africa.**

♦ Table 1:

The mean±se fatty acid content (g/100 g fat) of the milk Jersey (J) and Fleckvieh x Jersey (FxJ) cows in a partly pasture-based feeding system (LA = linoleic acid; CLA = conjugated linoleic acid; ALA = α-linolenic acid)

	Breeds		P-values		
Fatty acids	J	F x J	Breeds	Test	Breed x Test
Trans 18:1	0.918 ± 0.026	1.018 ± 0.020	0.003	0.019	0.723
LA n-6, 18:2	1.356 ± 0.036	1.509 ± 0.027	0.001	0.003	0.277
CLA (C9, T11, 18:2)	0.589 ± 0.022	0.690 ± 0.017	0.001	0.001	0.376
ALA n-3, 18:3	0.252 ± 0.014	0.283 ± 0.011	0.083	0.807	0.697
Total n-6	1.571 ± 0.040	1.754 ± 0.029	0.001	0.007	0.302
Total n-3	0.314 ± 0.016	0.350 ± 0.012	0.070	0.859	0.554
Ratio n-6/n-3	5.517 ± 0.172	5.590 ± 0.130	0.738	0.085	0.879
Total CLA	0.630 ± 0.023	0.740 ± 0.018	0.001	0.001	0.456

Statistical analyses

All milk samples (128 for J and 239 for FxJ) were analysed for 36 FAs. In the current study only the major FAs were presented. FAs were compared between breeds by analysis of variance using samples of all cows within breed as replicates using the GLM procedure (SAS Institute Inc.).

Results and Discussions

Some FAs differed ($P < 0.05$) between breeds being 1.533 ± 0.032 and 1.664 ± 0.025 for omega-6, and 0.621 ± 0.021 and 0.725 ± 0.015 g/100 g fat for total CLA content for J and FxJ cows, respectively (Table 1). The specific FAs trans 18:1, 18:2n-6 (LA, linoleic acid) and the main CLA isomer, C9 T11 18:2, also differed ($P<0.05$) between breeds. No significant difference in the omega-3 FA, α-linolenic acid (ALA, 18:3n-3) was observed. Maurice-Van Eijndhoven et al. (2011) compared 4 cattle breeds in the Netherlands, showing breed differences although results were confounded with breed-herd effects as only one breed per farm was sampled. Grazing- or non-grazing-based feeding systems largely influences milk FA composition (Palmquist et al. 1993). Kelsey et al. (2003) compared Holstein and Brown Swiss cows being fed a single diet and milk sampled on the same day to avoid confounding effects of diets and season. However, only minor differences between these two breeds were found. The CLA content of milk fat varied over threefold among individual cows. In the present study cows from both breeds were under similar feeding and management conditions.

The results of milk recording test as affected by lactation stage or DIM on the content of ALA and total CLA is presented in Figure 1. While the level of ALA was not affected ($P > 0.05$) by milk test event based on increasing DIM, for both breeds the CLA content in the milk fat increased po-

♦ **Dundonald – a dairy farm close to the Grootvadersbosch Nature Reserve is a pioneer farm in using Fleckvieh genetics.**

tentially following a curvilinear trend (R^2 = 0.74 and R^2 = 0.88 for J and FxJ, respectively). This would suggest that for CLA, a standard sampling time should be considered to determine cow differences for genetic merit analysis or that results should be adjusted for lactation stage or DIM. The CLA content of both J and FxJ milk increased ($P < 0.05$) by more than 40 % from early in the lactation (< 40 DIM) to later in lactation (> 140 DIM). Similar trends were not observed for other FAs.

However, Kelsey et al. (2003) found that lactation stage (DIM) had little effect (< 2.0 % of the total variation) on the CLA content of the milk fat of Holstein cows consuming a total mixed ration. Auldist et al. (1998) also found a small increase from 7.9 mg/g in early lactation (~30 DIM) to 9.7 mg/g FA in late lactation (~210 DIM). According to Stanton et al. (1997) lactation stage had no effect on CLA levels in milk fat, however, these studies were limited in scope, i.e. 36 cows ranging from 12 to 93 DIM. Frelich et al. (2009) found significant differences ($P < 0.05$) between farms in the concentration of five FAs while 16 FAs of milk fat differed ($P < 0.01$) between the indoor and the grazing period indicating the effect of pasture on FA content. The content of long-chain (> C16), mono- and poly-unsaturated FAs and CLA in the milk fat was higher in the grazing period. These results indicated a positive influence of seasonal grazing on the FA profile of cow milk fat as regards to its potential health effects for consumers (Frelich et al. 2009).

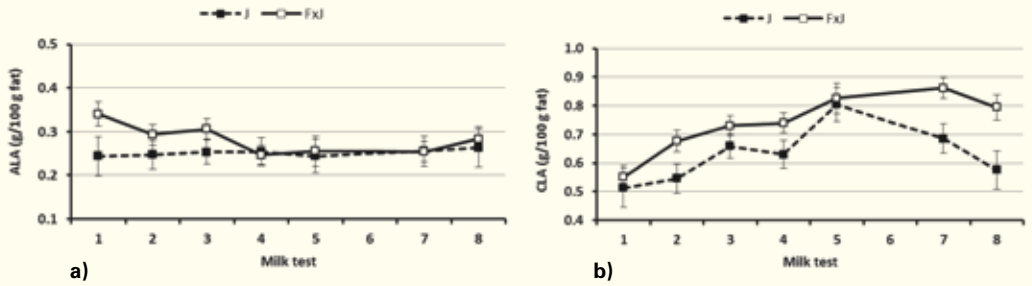
Conclusion

Some FAs differed between breeds although not all differences were significant. To demonstrate breed differences requires a significant number of animals from each breed. Milk test combined within DIM as per standard milk recording affected the CLA content of both J and FxJ milk which increased by more than 40 % from early- to mid-lactation. Further studies are required to determine the FA composition in different milk products.

♦

♦ Figure 1:

The (a) ALA and (b) total CLA (b) content of the milk of Jersey (J) and Fleckvieh x Jersey (FxJ) cows as affected by milk test



Beef quality and production traits

Beef is an excellent source for biological high valued nutrients. Protein, iron, zinc, selenium as well as vitamins of the B-group are readily available and easily absorbed and make beef very important for human nutrition. The nutrients in beef are essential for healthy growth and development.
A quality-oriented beef production is the premise to provide the consumer with tasty beef of high nutritional value.
Of course, beef quality depends on many factors like breed, feeding, management, transportation, slaughter and storage conditions. In this article we want to focus on the genetic influences on beef quality and production traits.

Bavarian Fleckvieh Genetics wants to make Fleckvieh competitive not only compared to specialized dairy breeds but also compared to beef breeds. When purchasing our AI bulls we set a high value on fattening performance, carcass quality and beef quality.
Progeny of every young bull are tested in state-run performance testing centers where important information on the carcass, beef quality, shear force and intramuscular fat is collected. This results in highly reliable EPD's for beef traits, which we publish with each of our bulls.
During the last years also a number of DNA-tests have been developed to assist in the selection of individuals. The company IGENITY® for example developed a genetic profile for multiple traits of economic importance for beef producers. The multiple-marker analysis includes the traits tenderness, retail meat yield, ribeye area, heifer pregnancy rate, docility, marbling, fat thickness, longevity and maternal calving ease. The results are represented in a scoring system for each trait using a scale of 1 to 10. Higher values are not necessarily better – they simply indicate the animal has the potential for more of that trait.
Bavarian Fleckvieh Genetics tested some sires with the IGENITY® Beef Profile.

Tenderness

Tenderness is one of the main quality traits of beef and is measured by means of shear force. Lower shear force means a more tender beef. A score from IGENTITY of 10 would be the most tender and 1 would be the least tender beef.
However, not only genetics but also the conditions before and after slaughter have an influence on the tenderness of beef.

Marbling Score

Marbling refers to the intramuscular fat found within a cut of meat and is key to flavor. Marbling has a very positive effect on the eating quality of beef. Intramuscular fat is the last fat to be deposited and the first to be utilized by the animal as energy source. There are differences in marbling between breeds that are mainly based on differences in the maturing process (early and late matu-

ring breeds). However, other production characteristics like feeding or gender have a greater influence on marbling than the breed. To maximize marbling, cattle must be on a high nutritional plane.
Higher scores from IGENITY for marbling equal a greater genetic potential for marbling.
Tenderness is more influenced by genetics than marbling. The genetic influence on marbling and tenderness of beef should not be overestimated. But we should keep in mind that many aspects work together and we should add our part in selecting animals with favorable genotypes to improve the beef quality of the Fleckvieh breed.

Retail Meat Yield

Higher scores from IGENITY equate to a genetic potential for a higher retail meat yield. Since higher values are a result of less fat and/or more muscle, animals with higher scores are expected to be less fat and/or more muscled.

Fat Thickness

Lower scores from IGENTIY indicate less external fat, while higher scores reflect more external fat.

Ribeye Area

Higher scores from the IGENTIY profile reflect larger ribeye areas and lower scores reflect smaller ribeye areas.

Higher Pregnancy Rate

Higher scores from the IGENITY profile for heifer pregnancy rate mean a higher percentage of heifers should become pregnant during the breeding season, which is measured at the first pregnancy check.

Longevity

The analysis for longevity from the IGENITY profile represents a female's ability to remain in the herd until six years of age or beyond.

♦ **DNA-tests help breeders to improve the profitability of their herd.**

Maternal Calving Ease

Higher scores from the IGENITY profile for maternal calving ease mean a higher percentage of unassisted births.

Docility

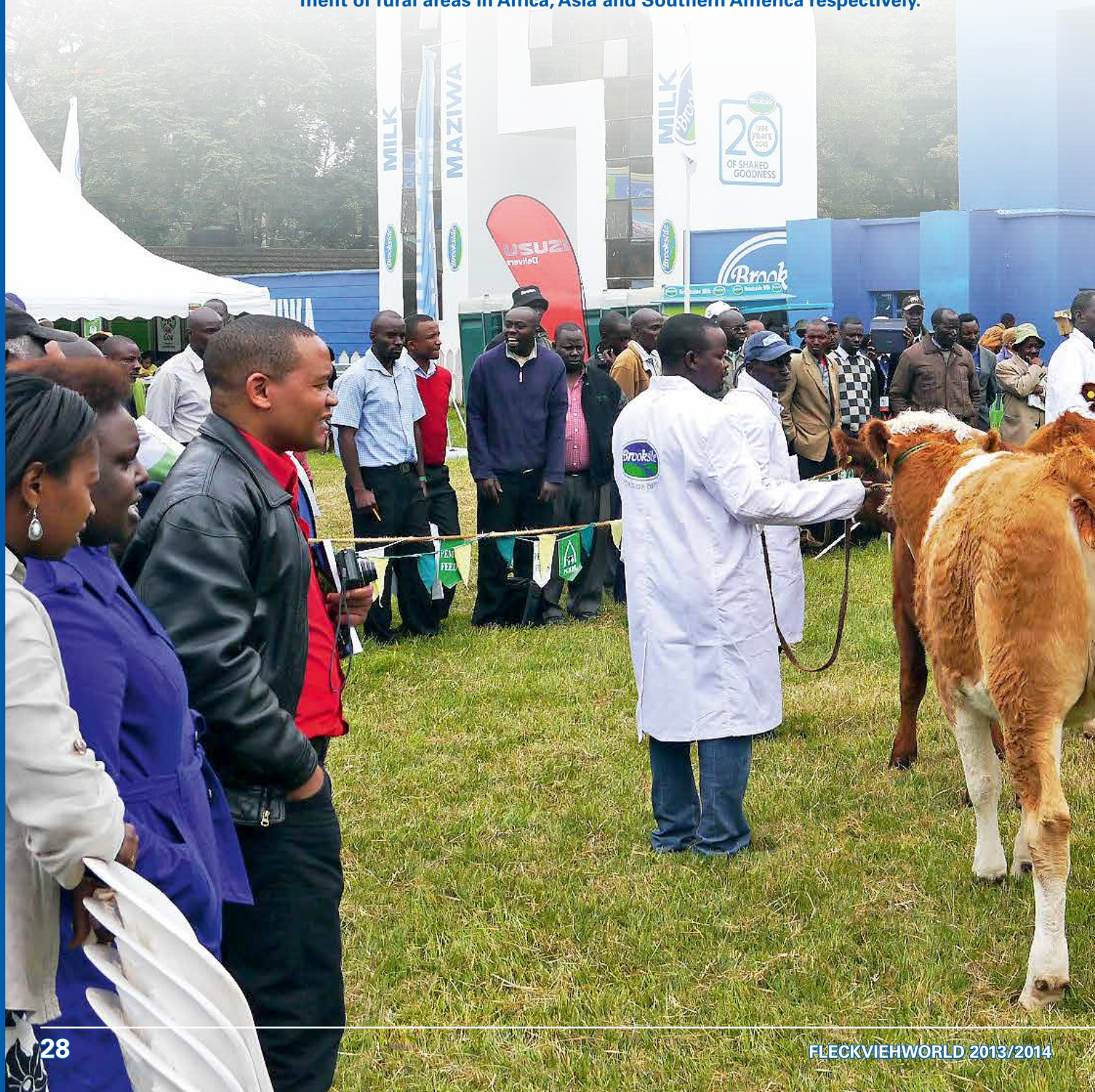
Higher scores from the IGENTIY profile indicate a higher percentage of calves that possess calmer behavior. The EPD's together with the IGENITY profile help the producers to improve the beef quality traits in their herds and to be more profitable in economically challenging times. Fleckvieh beef has an excellent taste and we should make the consumers aware of that.
Especially in times when the environmental impact of meat production is widely discussed in the public it makes sense to focus on a dual purpose breed like Fleckvieh to produce excellent meat in a very efficient way and we should take advantage of that. ♦

Fleckvieh & Biogas for African Farmers

Rural Economic Empowerment

- Dr. Thomas Grupp – BAYERN-GENETIK GmbH
- Dominic Wanjihia – BIOGAS INTERNATIONAL Ltd., Kenya

The Brookside Show in Nairobi/Kenya, a tremendous fair for the agriculture industry in East Africa was the start of a unique partnership for a sustainable development of rural areas in Africa, Asia and Southern America respectively.



Dominic Wanjihia, the CEO of Biogas International Ltd. a start-up company for renewable energy with its headquarters in Nairobi, Dr. Thomas Grupp/CEO of BAYERN-GENETIK GmbH and Gerard Besseling/CEO of Fleckviehgenetics East Africa Ltd. agreed on the verge of Brookside Livestock Breeders Show 2013 to combine the expertise of the 3 companies to the benefit of rural areas in developing countries in and outside of Africa.

Agriculture in Kenya

Agriculture is the most important single industrial sector, the backbone of the Kenyan society. Contributing more than 20 % of the GDP and employing about 75 % of the Kenyan labor force the development of agriculture has great impact on the whole economy. About 80 % of the Kenyan population lives in rural areas where subsistence farming and pastoralism is the predominant way of agriculture and

♦ **Teasing of Show cattle – a short lesson to the Masai people with Dr. Grupp.**

♦ **Historic moment – first judging of Fleckvieh as a dual purpose breed in Nairobi.**

livestock production. The main policy to improve the conditions in the rural areas is the increase of productivity of small holders and as a result the income per farm. National food security to fight hunger and environmental sustainability play an important role in the Kenyan key policy issues. Because only 17 % of the country´s land is high and medium potential agriculture land where most intensive crop and dairy production take place. The rest is arid or semiarid and not suitable for rain fed agriculture. Only 7 % of the cropped land is under irrigation, so the rest is highly dependent on good rains. Droughts and floods have increased during the past decades resulting in high crop failure and livestock deaths („Climate Change"). Degradation of land increased during the previous years due to deforestation, droughts, floods and erosion with the consequence that poverty in rural areas is still the major concern. Kenya's agriculture could play a much bigger role in the future of the African continent, if it could solve its basic problems in the underdeveloped regions (Alila u. Atieno, 2006).

The livestock industry is the most important sector which contributes 10 % of GDP and employs about 50 % of the agricultural labor force. Main problems can be seen in

- Climate conditions
- Environmental problems
- Bad infrastructure
- Lack of Management skills (education)
- Shortage of energy (electricity, firewood)
- Productivity of livestock

The improvement of livestock (productivity in milk & beef), pasture management and the supply with „clean" energy is a tremendous challenge for Kenya and all neighboring countries.

Risk factors for Agriculture in East Africa

Growth of population

The population of East African countries will increase in a 17 years period (2008-2025) up to 30 % which is far above the global increase of 19 % in the same time (see figure 1).

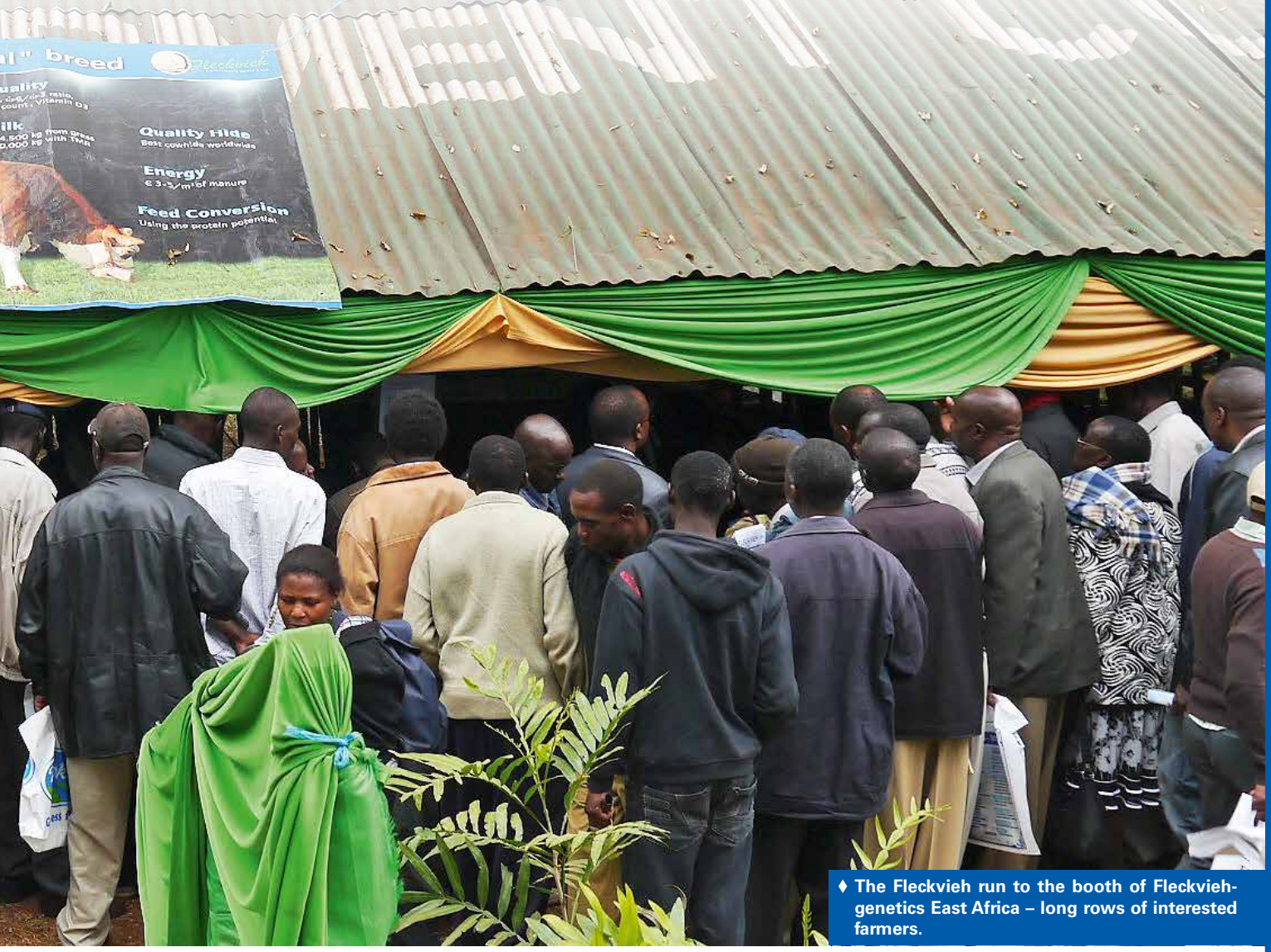
♦ Figure 1:

Increase of Population worldwide and East African countries in the period 2008 - 2025

World Country	Population 2008 in Mio.	Projected Population 2025 in Mio.
World	6.705	8.000
East Africa	301	440
Ethiopia	79.1	110.5
Tanzania	40.2	58.3
Kenya	38.0	51.3
Uganda	29.2	56.4
Rwanda	9.6	14.6
Somalia	9.0	14.3
Burundi	8.9	15.0
Eritrea	5.0	7.7

♦ **(Source: Carl Haub and Mary Mederios Kent, 2008 World Population Data Sheet).**

♦ **Strong partnership for Fleckvieh in East Africa – from right to left: Gerard Besseling/CEO and Dr. Anthony Gichohi/Vet & Fleckvieh Consultant, Dr. Thomas Grupp/CEO.**



♦ **The Fleckvieh run to the booth of Fleckvieh-genetics East Africa – long rows of interested farmers.**

The rapid growth of population in East Africa in the next 12 years will have a lot of influence on the agriculture industry but also on the political stability of East African countries. Food security is the main issue in the next decade – it is high time for more efficiency per hectare in all agricultural sectors, especially the livestock industry, so there must be a logic trend for „universal breeds" like Fleckvieh.

Energy supply

Domestic energy supply in Kenya and Uganda is considered to be about 80 % and 94 % dependent on wood fuels respectively. The expected impact on forests will be catastrophic in the near future. The per capita use of wood fuels is about 1 ton per year. In Kenya alone, natural replacement rates of wood are expected to be less than 60 %, so wood supplies are disappearing by 40 % each year. Given the above stats, in less than ten years time, the impact on still intact forests will be an ecological disaster with all the negative side effects like:

- Deforestation
- Drying out of rivers
- Erosion
- Giving up landuse
- Poverty
- Rural depopulation
- Disapperance of wildlife
- Decline in tourism
- Economic depression

Rural Africa needs affordable, renewable and sustainable fuel in the short term.

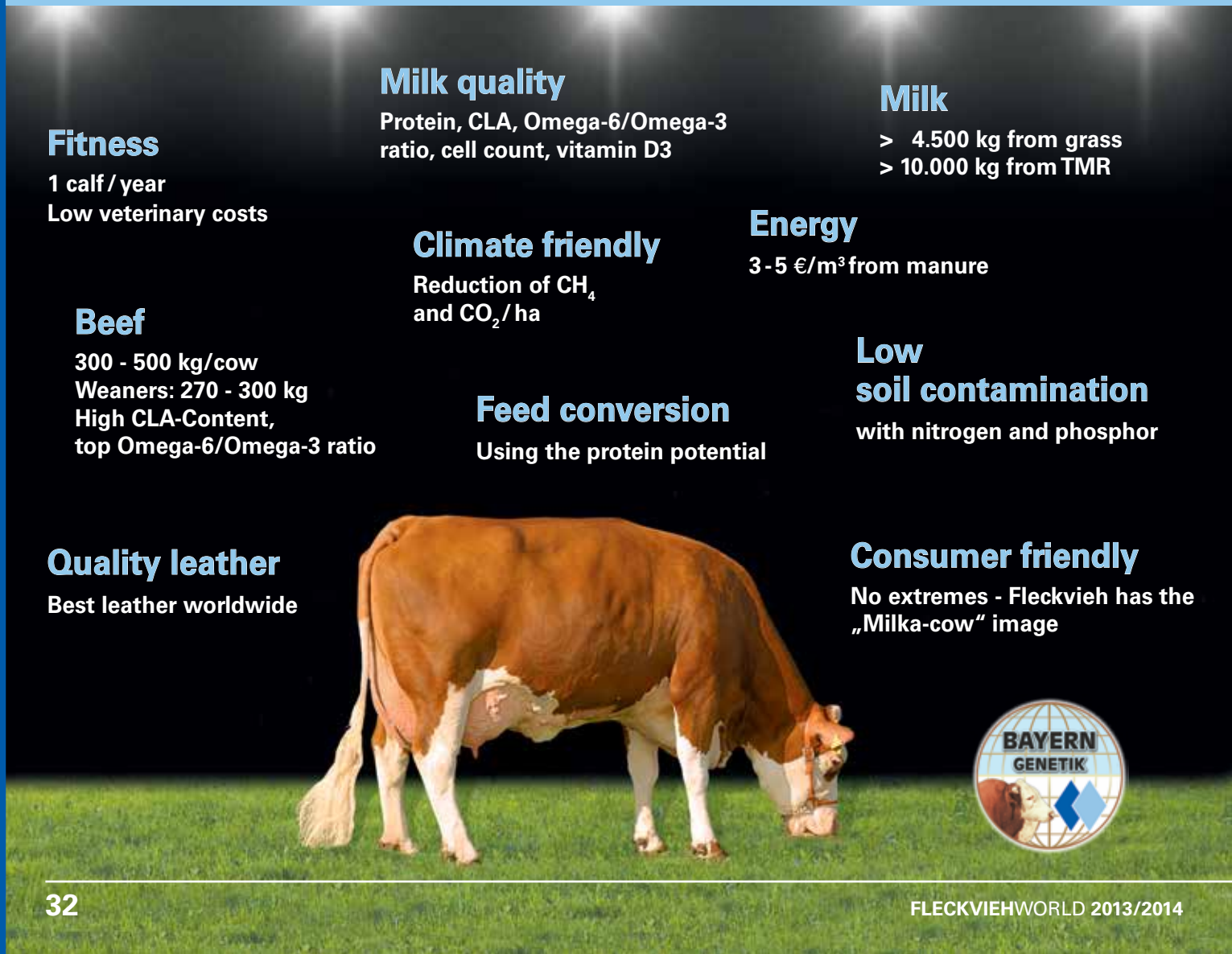
Fleckvieh & Biogas –

the easy solution package for developing countries

Fleckvieh – the Universal Breed

In 2009 Kenya discovered Fleckvieh as a highly efficient universal breed to supply the country with high quality milk & beef, the top skin for the leather industry, a breed which is climate friendly because of concurrent production of milk & beef and as a supplier of manure for the production of renewable energy.
After 4 years of intensive education and consulting Gerard Besseling and Dr. Anthony Gichohi from Fleckviehgenetics EA can see that the seed falls on fertile ground. The interest in this unique breed is just unbelievable as could be seen at the Brookside Live-

FLECKVIEH – the Universal Breed



stock Breeders Show 2013. Lack of logistics and use of artificial insemination is still a problem for the rural areas but should be overcome step by step. Carefully selected bulls (pigmentation, adaptability) are used for crossbreeding on Holsteins, Ayrshires, Jerseys and the predominant local breeds like Sahiwal and Boran. During the next years thousands of crossbreds will be able to show the improved performance on the bigger dairy farms but also especially in the rural areas where small holders and pastoralists are predominant.

Biogas – clean, green & simple

The vision of Dominic Wanjihia, owner of Biogas International Ltd. is to preserve the African environment by protecting the forests from the menace of charcoal. He developed the Flexi Biogas plant which is an affordable, sustainable alternative cooking energy to prevent the demand of wood fuel on tropical rain forests, the only carbon sink and the primary body that encourage rain that feeds the rivers. Dominic, as a Kenyan citizen knows only too well that „Water is life".
Keep it simply logic – one of the main mottoes of his company is to break down complicated technical and biotechnical processes in order to make solutions available for the benefit of people and the environment.
Flexi Biogas is a contemporary anaerobic fermentation digester that will recycle virtually any biodegradable organic matter into methane rich Biogas and mineral rich fertilizer. Incorporating Greenhous Capture Technology, the unmatched efficiency allows dung from a single cow to produce all the daily cooking fuel for the typical 4-6 member homestead, including cooking githeri („traditional Kenyan meal of maize and kidney beans" that takes 2-3 hours cooking on wood-fuel stoves).
Flexi systems are compact and can be transported to the most remote corners. The systems install in only a few hours, and conditions allowing will be up and running in 7-10 days. The clean burning methane has untold benefits to the women and children who traditionally spend numerous hours inhaling poisonous gases and smoke from traditional wood fueled open fire three stone stoves. Flexi Biogas can bring the miracle of Biogas to the common man. This is where green energy has the most impact. It is in numerous rural homesteads that millions of trees are consumed as an energy source every day. Kenya´s forests have been destroyed through its undying thirst of relatively cheap energy in the form of charcoal and firedwood.
The Flexi Biogas system consists of a UV resistant reinforced PVC tarpaulin envelope that is sealed at both ends. There is a ground based UPVC pipe on both ends for input and output. The envelope is housed in a micro-greenhouse tunnel

♦ **The compact Flexi Biogas System – with the moped to rural areas.**

♦ **„Seeing is believing" – Road Show of the Flexi Biogas System.**

♦ **Installed Flexi Biogas plant – ready for dung, biomass or feces.**

♦ **Biogas – blessings for African women, they can feel the revolution every day. The wood fuel search is history.**

that serves two primary purposes. It shields the envelope from changing weather conditions and it also keeps the envelope warm which enhances anaerobic bacteria activity. More gas is produced from thermophile bacteria's under warm conditions.

The input matter that is used in the Flexi Biogas System is diverse. Fleshy organic waste such as animal dung, tomato cuttings, grass, weeds and kitchen waste can be used. The input matter is mixed with water in a ratio of 1 : 1. The mixture is then poured into the input pipe which leads it into the envelope. They are referred to as digesters because they operate in the same way as our digestive system. After 4 -10 days, biogas is produced in useable quantities. The envelope fills up with gas and pushes exhausted organic waste through the output pipe. Exhausted material in this case refers to material that has undergone the anaerobic process that produces biogas. There is a constant flow of organic waste from the input to the output pipe.

The miracle of Flexi Biogas

Flexi Biogas provides a resource that can be used to improve livelihoods. It also creates a source of income, saves on the other energy sources and improves people´s health. The biogas is environmentally friendly.

Using Flexi Biogas prevents deforestation in the short term and drought, famine and desertification in the long run.

- **Women and children**

  Indoor air pollution caused by firewood and charcoal is a leading cause of disease in developing countries. Respiratory diseases affect women and children because they spend the most time in the kitchen.
  Women and children also spend a lot of time looking for firewood. This reduces the amount of time children spend on their studies. Their grades are negatively affected by this.

- **Mechanical application**

  Biogas can be used to run electricity generators. With electricity, the users can run chaff cutters, water pumps and light their homes.

- **Environmental conservation**

  Flexi Biogas systems are now being rolled out around the world heritage site, Mt Kenya National Park, and the Abadare forest ranges. Bothe ranges are Kenya's and East Africa's crucial water towers. Flexi systems are targeted at schools and children's homes in the aim of changing the mindsets and habits of the future generations, and in doing so leaving the forests to regenerate.

- **Universal Relevance**

  The Flexi Biogas system is affordable and easy to install. It serves everyone across to social strata. It is used by poor farmers, professionals and business men. It is used in children´s homes, educational institutions and by meat processors. Biogas should not be the preserve of the rich.

- **Dependable energy source of the future**

  Kenya and many other African countries are not able to electrify the rural areas. Biogas as a renewable energy could become the main energy source in the near future for very home.

Fleckvieh & Flexi Biogas

Dairy Ranching with Fleckvieh to produce healthy milk & beef in rural areas is already a proven tool for rural economic empowerment. The partnership with Flexi Biogas provides a „power package" to the farmer, small holder or pastoralist. Both products complement one another and enable farmers to make money & profit out of the smallest farm in terms of local micro-economic units.

Marketable products:

- Milk
- Beef
- Livestock
- Skin
- Dung & manure
- Biogas & energy
- Fertilizer

Secondary effects:

- Conservation of nature
- Improving public health
- Stop of rural exodus
- Better education of the youth
- Reduction of work load for women and children

Our own experience and our vision for a sustainable development and change in all African countries prefer an initiative „Fleckvieh & Biogas" in order to get simple and non complicated solutions.

♦

Agrofarma Kijovsky – the largest producer of Fleckvieh bulls for natural mating in Slovakia

♦ Vladimír Varchola, BAYERN-GENETIK Slovakia, s.r.o and Ing. Peter and Frantisek Kijovsky

One of the most important regions in Eastern Slovakia is Saris, dominated by the royal castle built in 1217. Today Saris is better known for its beer production, as there is the largest brewery in Slovakia. Only 5 minutes by car to the west, near the castle hill at an altitude of 320 meters, the village Medzany is located.

Until 1991, the village was part of a large agricultural cooperative with nearly 1.000 hectares of agricultural land. After the breakup of the former cooperative, Mr. Kijovsky established the family farm AGROFARMA Kijovsky. He started in 1994 by purchasing the Medzany Farm from the former members of the coop. This process lasted until 1997. After graduating from University, Mr. Kijovsky's son Peter joined the farm.

This was the foundation of one of the first family farms that work with Fleckvieh in Slovakia. Today 332 ha of arable land and 28 hectares of permanent grassland belong to the farm.
The arable land is used for the production of crops like wheat and barley and for growing forage crops. 30 hectars are cultivated with alfalfa, 55 ha are used for growing corn for corn silage and 12 ha are planted with clover seed.

These crops create the base for the feed of the 230 head of cattle. Two employees take care of the cattle in the barn and two ladies do the milking of the cows. The feed ration for the dairy cows consists of 35 kg of basic feed, composed of 2/3 corn silage and 1/3 grass silage, concentrates with proteins, hey and a vitamin-mineral premix.

For the young stock, the corn silage/grass silage ratio is changed to the opposite, they get 1/3 of corn silage and 2/3 of grass silage. Heifers are bred for the first time at a live weight of 430 to 450 kg, a weight they usually reach at an age of 28-30 months.

♦ Peter Kijovsky in front of the barn with his bulls for natural mating.

♦ **The bulls after linear evaluation.**

♦ **The bulls are ready for shipping. Most of them are pre-confirmed.**

♦ Table 1:

Current results of milk recording from AGROFARMA Kijovsky

Por. lact.	No. of animals	Days in lact.	Milk kg	Fat kg	Prot. kg	Fat and prot. kg	Age at 1st calving (months)	Intercalving period
1st.lact	25	345	7021	264	240	505	30	
2nd. and more lact.	45	335	7965	316	275	592		371
All lact	70	340	7856	317	271	589		

♦ Table 2:

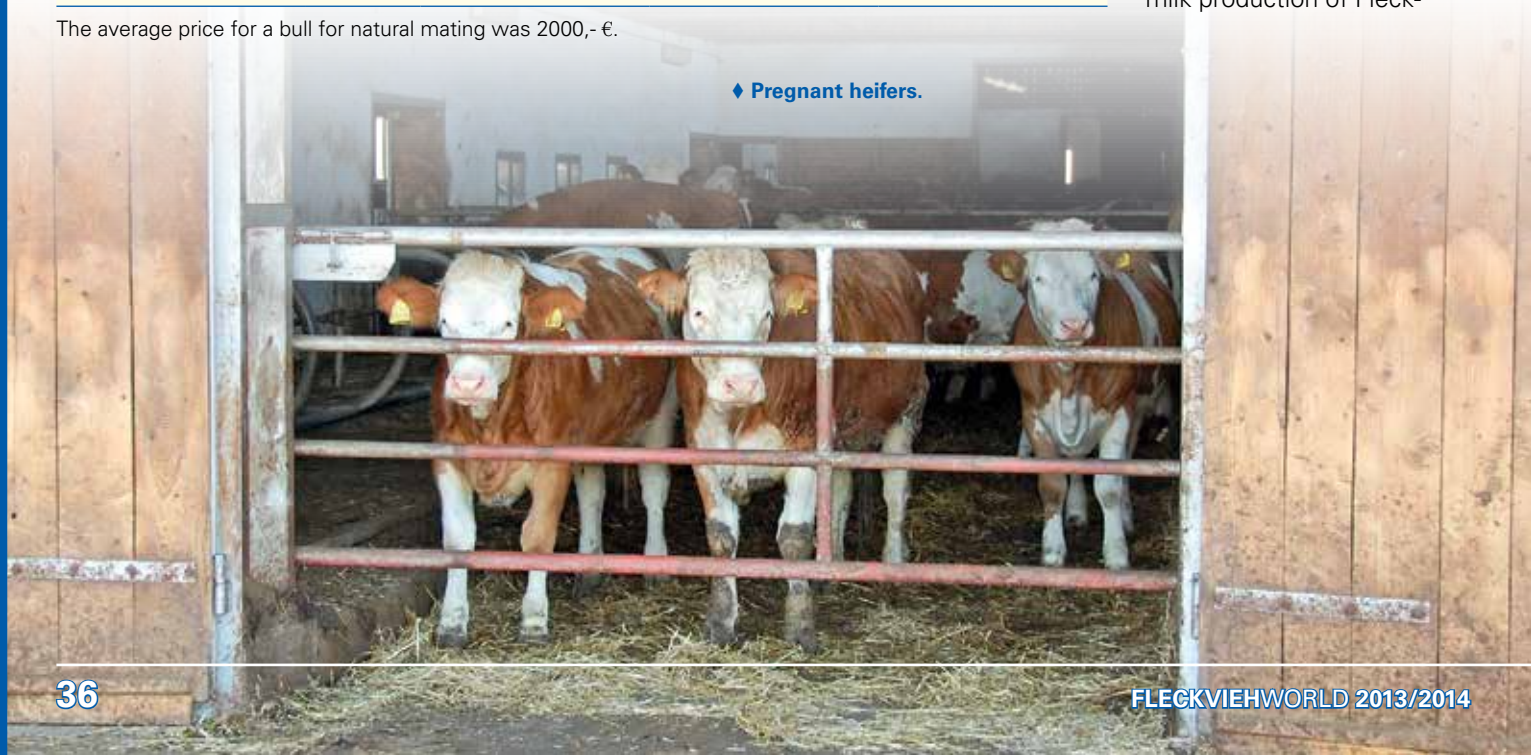
The biggest breeding bull producers in Slovakia

Farm	2007	2008	2009	2010	2011	2012	All
Agrofarma Kijovsky	18	6	12	11	8	9	64
MKM Druzstevna	15	10	7	5	1	9	47
PD Kozarovce	7	7	4	7	2	2	29
AGRO-LENT Saris	2	1	7	6	6	7	29
PD Sekcov Tulcík	6	0	2	5	7	8	28

The average price for a bull for natural mating was 2000,- €.

In the quota year 2012/2013 milk production was 655.000 kg in total. 63.000 kg were sold directly through two milk vending machines, installed in the nearby cities of Sabinov (12 thousand inhabitants) and Sarisské Michalany (3 thousand inhabitants). The milk delivered to the milk factory has about 200.000 somatic cells and a bacteria count of 19.000. Average components are 4.05 % fat and 3.35 % protein.
For comparison: the average milk production of Fleck-

♦ **Pregnant heifers.**



♦ **Calves housed in groups.**

♦ **Production barn-lactating cows.**

vieh cows in Slovakia was 5.640 kg in the year 2012. However, Fleckvieh is the only breed, of which the population increased by 925 heads compared to last year. The main source of income on AGROFARMA Kijovsky is milk production. The actual milk price is € 0.32 per liter. Additional money is earned by the sales of heifers and calves, but the biggest part comes from the marketing of breeding bulls for natural mating – since 2007 Mr. Kijovsky is the largest producer of Fleckvieh breeding bulls.

Mr. Kijovskýs plans for the future are to keep the number of cows at 90 head. At the same time he wants to increase the average milk production per cow to 7.500 kg with 4.15 % fat and 3.40 % protein. „In my opinion, at this production level I can achieve the optimal cost-benefit ratio. A higher milk production would mean rapidly increasing costs for concentrate, which would result in a lower profitability of milk production."

When selecting bulls for breeding, Mr. Kijovský prefers sires, which are not too high in milk production. He focuses on efficient cows that are easy calving, have excellent functional type traits (feet and legs, udders) and a long productive life. Currently the bull he likes most is ZAUBER.

When asked, what should be changed in Slovakia to make business easier for farmers, Mr. Kijovský answered: „If I would not have to fight an excessive bureaucracy to handle myriads of permits and constantly survive inspection, I would be living much easier and might have more time to work with my animals."

Let's hope that the new agricultural policy after 2014 will bring positive changes for farmers and that the farm of Mr. Kijovsky will have a bright future.

♦

♦ **Bulls waiting for linear evaluation.**

Ten years with Fleckvieh and a major dairy expansion at Riedbow

♦ Dr. John Popp, Big Bear Genetic Ltd., North America

Riedbow Dairy at Elm Creek, Manitoba was one of the very first dairies to use Fleckvieh for absorption crossing. When they started, they were milking just over one hundred cows. Today Riedbow is home to over 500 Fleckvieh cross cows ranging in Fleckvieh percentage from 50 % all the way to 87.5 % with a few purebreds also milking on the farm. The dairy underwent a major expansion over the course of the last years and therefore is also milking Holstein cows as all expansion from within herd was not possible. Ale Riedstra still speaks to the Fleckvieh breed with enthusiasm. He also shares what he has learned over the years.

„When we started out, we kept every heifer - we needed everything to be able to handle our expansion! Now that we are at the size we want to be, we can finally do 'voluntary' culling. We have lots of heifers in the system. Cows that lack in production - or some that are just not structured the way we like them - we ship them." Ale agrees that not all animals are perfect.

„For so many years we were used to keeping every single heifer on the farm - that was just standard when we milked a herd of Holsteins. Today, heifers that come in as strong on milk production - we ship them! The same goes for older cows! The way we cull on our herd is different now", he admits. „We used to lose a lot of cows to reproduction and feet and legs.

♦ Riedbow Dairy has seen a great improvement in feet and legs.

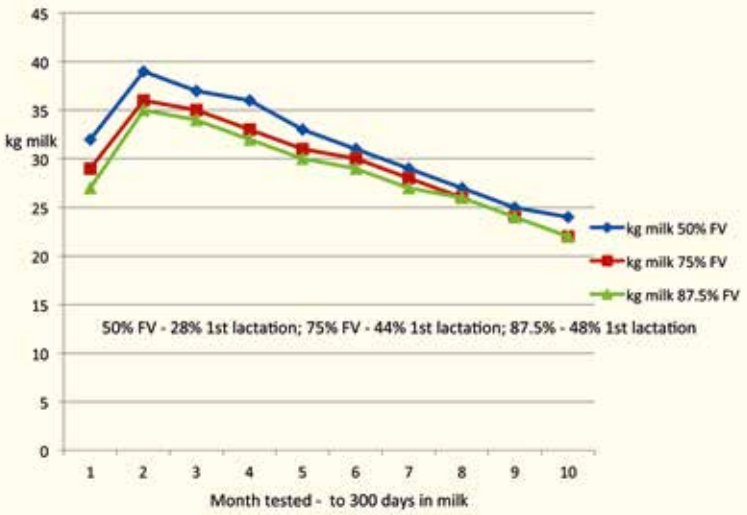
♦ Ale Riedstra likes cows with good productive life.

♦ **Veterinary costs are lower and cows are healthier.**

♦ Image 1:

Do lactation profiles change with different percentages of Fleckvieh?

To that effect Ale summarized lactation graphs of the cows



Lactation graph profiles remain similar at different percentage of Fleckvieh blood. The curves for F2 and F3 show lower production as there are 44 and 47 % first lactation cows, respectively which comprise the data.

28 % of the animals are in first lactation for the group that are 50 % Fleckvieh. Flat persistent lactations appear relatively unchanged with an increasing percentage of Fleckvieh in the breeding program.

Some of those 'involuntary' culls from the past are now filled with 'voluntary' culls for animals with lower production!" The herd today averages around 30 kg (66 lbs) with the butterfat between 3.9 and 4.0 % and protein at 3.5 to 3.55 %. The herd lactation currently is at 2.5 with the intercalving period at 398 days and the herd at 150 days in milk.

„In our 'former years' of production primarily with Holstein our days in milk were typically at 185, the intercalving at 425 days components at 3.9 fat and 3.35 to 3.4 protein with comparable production. Once in a while we needed to purchase extra animals," says Ale. „Our expenses relating to transition and cow health have fallen substantially."

Ale admits that they are not at the perfect herd - or where he would like to see it, yet, but is able to show 126 Fleckvieh cross animals within a herd of 700 at four or more lactations. „Productive life is a huge financial contributor on a dairy farm that we just don't realize; we have cows that get pregnant year after year...they know the routine. We have 36 cows sired by Engadin - honestly I just don't notice them - they just do their job.

Enrico was a bull we used heavy on heifers when we started - there are forty in the herd at 3.4 lactations average giving 29.9 kg of milk."

Data in Table 1 is not corrected for days in milk so that the reader can have a current herd 'snapshot'. „Milk production has not dropped to any great degree as we have moved to a higher percentage of Fleckvieh; flat persistent lactations and good fertility has kept things going for us" notes Ale, „nothing is perfect but at the end of the day we believe we have a healthier cow and seeing the young stock coming is exciting. I can now refine the breeding more and more."

♦

♦ Table 1:

Herd Production Breakdown by Fleckvieh % blood and age

Lactation	50 % FV	KG milk	DIM	75 % FV	KG milk	DIM	87,5 %	KG milk	DIM
1	84	27.6	203	107	28.6	196	47	27.9	169
2	66	30.8	164	48	30.3	144	15	28.8	129
3	60	29.2	189	52	29.5	176	3	33.2	114
4	42	31.7	158	30	33.3	136			
5	26	31.8	171	5	37.6	143			
6	17	28.2	187						
7	5	25.3	170						
8	1	40.3	38						

Fleckvieh in Crossbreeding Systems with Commercial Dairies in South Dakota and Alberta

♦ Dr. John Popp, Big Bear Genetic Ltd., North America

In 2010 South Dakota State University in conjunction with two large commercial dairies - Hammink Dairy and Drumgoon Dairy began a trial to look at the introduction of Bavarian Fleckvieh within crossing programs. Drumgoon Dairy, owned and managed by Rodney and Dorothy Elliott currently milks 1800 cows at Lake Norden and Hammink Dairy, owned and managed by Wim and Nicolien Hammink currently milk 2000 cows at Bruce. Both dairies have historically employed crossbreeding for differing reasons.

The Elliotts started with a mixed herd of Holstein cows and introduced a significant amount of Swedish Red and Jersey in their crossbreeding system. Hammink Dairy thought highly of the efficiency of Holstein crossed with Jersey and maintained this two way cross for many years by implanting Holstein Jersey Cross in the cows. Over the course of the past three years, Wim also decided to use Swedish and Norwegian Red on the Holstein Jersey cows.

The dairies in colaboration with Dr. Alvario Garcia at South Dakota State University and Dr. John Popp of Big Bear Genetics agreed to look at Fleckvieh within their crossing systems and determine the productive life of Fleckvieh crosses along with production, fertility and health traits on their herds.

At Drumgoon Dairy, Fleckvieh was bred primarily to hard to breed Holsteins and also to cows deemed as being 'too dairy' to remain functional within the herd. A further objective was to breed for the birth of Fleckvieh calves in the harshest winter months as their survivability was found to be greater over other crosses, specifically those resulting from Jersey. The Elliott's further used this strategy as the demand for male Fleckvieh calves in the

♦ The Elliots have found the Fleckvieh Crosses to be very healthy – cow sired by BFG Engadin from Bavarian Fleckvieh Genetics.

♦ Fleckvieh amongst Jersey and Swedish Red Crosses at Hammink Dairy.

♦ The Fleckvieh Crosses compete well at the feed bunk.

spring has been very good and was rewarded with greater financial return. Sires used in the study were Engadin, Enrico and Mandela.

Drumgoon Dairy comments positively on Fleckvieh Cross health noting that they do not recall a single animal being in the hospital pen. Calves respond well to treatment if sick and the Elliott's feel that overall health traits are very good.

At Hammink Dairy, Fleckvieh was used on Holstein and also Holstein Jersey Crosses. The Hamminks used the semen randomly on all cows within the herd with no particular mating target animals. Reproduction results at Hammink Dairy on 1st lactation Fleckvieh animals had 23 of 53 pregnant on the first service, 16 pregnant on two services, 8 pregnant on three services and three going to a fourth breeding.

Bles Wold Dairy is a farm situated near Lacombe, Alberta - Canada. The Bos family has been using Fleckvieh in crossbreeding for almost ten years and their herd production records are verified by the Canadian Dairy Herd Improvement Association. Typically the herd has higher production but being able to preserve high quality feeds was more of a struggle in 2012. Bles Wold also processes their milk on farm and markets both a yogurt drink and yogurt. For more detailed information about the dairy they have a website http://www.bles-wold.com/home.htm. Owner Hennie Bos summarized some DHI data on the animals on his farm to add to the information provided in this report. ♦

♦ Table 1:

First Lactation Animals at Drumgoon Dairy

Sire Group/Cross	No. Animals	DIM	Production (lbs)	Days Pregnant
Fleckvieh	15	151	67.6	43
Scandinavian Red	20	84	73.3	13
Jersey	45	120	77.3	20
Holstein	34	136	82.8	36

♦ Table 2:

Second Lactation Animals at Drumgoon Dairy

Sire Group/Cross	No. Animals	DIM	Production (lbs)	Days Pregnant
Fleckvieh	9	131	98.9	33
Scandinavian Red	21	244	73.6	109
Jersey	95	95	83.9	48
Holstein	35	181	83.7	65

♦ Table 3:

First Lactation animals at Hammink Dairy

Sire Group/Cross	No. Animals	DIM	Production (lbs)
Animals within same pen			
Fleckvieh	19	133	76.1
Scandinavian Red	38	137	73.3
Jersey	95	95	77.3
Holstein	18	120	82.8
Total Fleckvieh on farm	53	156	64.0

♦ Table 4:

Summary of Fleckvieh Animals at Bles Wold Dairy

Sire Group/Cross	No. Animals	DIM	Production (kg)	Fat	Protein	SCC
First Lactation						
Fleckvieh (50 %)	17	222	28.8 kg	3.9	3.5	118
Fleckvieh (75 %)	44	150	25.8 kg	3.6	3.2	90
Second Lactation						
Fleckvieh (50 %)	15	142	33.5 kg	3.7	3.2	59
Fleckvieh (75 %)	70	177	31.5 kg	3.8	3.3	118

BFG ETTAL

10/192116

Born: 03/24/2004
Breeder: Schöndorfer, Piding
S: Enrico 187454
D: Salon 09.35736004
DS: Malefiz 10/160055

Line: Eder

87 % Fleckvieh, 13 % Red Holstein

gTotal Merit Index	114	97%
Milk Index	**108**	**99%**
Daughters	192	
Milk-kg	6120	+202
Butterfat-%	4.16	-0.04
Butterfat-kg	255	5
Protein-%	3.51	+0.07
Protein-kg	215	12
Beef Index	**103**	**99%**
Net Gain	104	99%
Dressing Percentage	94	99%
Carcass Conf. Score	109	99%

Fitness			**109**	**94%**
Fertility	1		108	81%
Calving Ease	106	99%	115	99%
Stillbirth	105	99%	110	97%
Productive Life			102	92%
Somatic Cell Count			102	99%
Milking Speed			122	99%
Persistence			88	99%

Pigmentation Body
54% red — 24% dark yellow
38% covered — 40% spotted
Pigmentation Eyes
9% both eyes — 6% one eye

Evaluation of the progeny — relative figures for each trait
Number of the evaluated animals: 401

			64 76 88 100 112 124 136	
Body	100			
Muscularity	95			
Feet & Legs	92			
Udder	107			
Cross Height	101	Small		Big
Body Length	104	Short		Long
Hip Width	99	Narrow		Wide
Body Depth	94	Flat		Deep
Pelvic Angle	104	Flat		Sloped
Hock Angularity	104	Posty		Sickled
Hock Development	101	Well-developed		Dry
Pasterns	92	Weak		Posty
Hoof Height	87	Low		High
Fore Udder Length	99	Short		Long
Rear Udder Length	101	Short		Long
Att. of Fore Udder	112	Loose		Firm
Suspensory Ligament	80	Not marked		Clear marked
Udder Height	107	Low		High
Teat Length	107	Short		Long
Teat Thickness	87	Thin		Thick
Teat Placement	121	Outwards		Inwards
Rear Teat Placement	103	Outwards		Inwards
Udder Purity	100	Added teats		Pure Udder

- ***Fitness***
- ***Milking speed***
- ***Calving ease***

BFG HAERTSFELD

10/188759

Born: 08/11/2005
Breeder: Wagner, Birglbach
S: Hulock 178434
D: Heline 09.34087386
DS: Lotarry 08/2724000

Line: Huch

98 % Fleckvieh, 2 % Red Holstein

gTotal Merit Index	116	89%
Milk Index	**109**	**92%**
Daughters	74	
Milk-kg	6322	+555
Butterfat-%	3.94	-0.14
Butterfat-kg	249	12
Protein-%	3.29	-0.10
Protein-kg	208	11
Beef Index	**113**	**91%**
Net Gain	112	93%
Dressing Percentage	109	87%
Carcass Conf. Score	109	91%

Fitness			**109**	**83%**
Fertility	-1		102	65%
Calving Ease	106	99%	103	83%
Stillbirth	107	96%	114	75%
Productive Life			102	76%
Somatic Cell Count			104	89%
Milking Speed			92	90%
Persistence			112	92%

Pigmentation Body
42% red — 30% dark yellow
81% covered — 19% spotted
Pigmentation Eyes
45% both eyes — 11% one eye

Evaluation of the progeny — relative figures for each trait
Number of the evaluated animals: 83

			64 76 88 100 112 124 136	
Body	109			
Muscularity	108			
Feet & Legs	104			
Udder	109			
Cross Height	111	Small		Big
Body Length	111	Short		Long
Hip Width	108	Narrow		Wide
Body Depth	106	Flat		Deep
Pelvic Angle	115	Flat		Sloped
Hock Angularity	88	Posty		Sickled
Hock Development	90	Well-developed		Dry
Pasterns	102	Weak		Posty
Hoof Height	111	Low		High
Fore Udder Length	107	Short		Long
Rear Udder Length	99	Short		Long
Att. of Fore Udder	115	Loose		Firm
Suspensory Ligament	88	Not marked		Clear marked
Udder Height	108	Low		High
Teat Length	98	Short		Long
Teat Thickness	99	Thin		Thick
Teat Placement	106	Outwards		Inwards
Rear Teat Placement	103	Outwards		Inwards
Udder Purity	97	Added teats		Pure Udder

- ***Type traits***
- ***Bloodline***
- ***Dual purpose***

95 % Fleckvieh, 5 % Red Holstein

Evaluation of the progeny Number of the evaluated animals: 2083		relative figures for each trait 64 76 88 100 112 124 136	
Body	116		
Muscularity	105		
Feet & Legs	112		
Udder	114		
Cross Height	117	Small	Big
Body Length	119	Short	Long
Hip Width	118	Narrow	Wide
Body Depth	115	Flat	Deep
Pelvic Angle	98	Flat	Sloped
Hock Angularity	102	Posty	Sickled
Hock Development	102	Well-developed	Dry
Pasterns	107	Weak	Posty
Hoof Height	112	Low	High
Fore Udder Length	109	Short	Long
Rear Udder Length	106	Short	Long
Att. of Fore Udder	113	Loose	Firm
Suspensory Ligament	97	Not marked	Clear marked
Udder Height	105	Low	High
Teat Length	101	Short	Long
Teat Thickness	107	Thin	Thick
Teat Placement	116	Outwards	Inwards
Rear Teat Placement	108	Outwards	Inwards
Udder Purity	97	Added teats	Pure Udder

Sexed semen available!

- ***Typ traits***
- ***Fitness***
- ***Attention calving ease***

BFG ILION

10/185090

Born: 10/22/2002
Breeder: Bell, Großesterndorf
S: Regio 191190
D: Karla 09.30189399
DS: Erfurt 01/21773

Line: Redad

gTotal Merit Index	**119**	99%
Milk Index	**107**	99%
Daughters	8867	
Milk-kg	6629	+313
Butterfat-%	4.10	-0.09
Butterfat-kg	272	6
Protein-%	3.45	-0.01
Protein-kg	229	10
Beef Index	**112**	99%
Net Gain	114	99%
Dressing Percentage	103	99%
Carcass Conf. Score	107	99%

Fitness			**116**	99%
Fertility	2		106	97%
Calving Ease	84	99%	112	99%
Stillbirth	99	99%	106	99%
Productive Life			115	99%
Somatic Cell Count			109	99%
Milking Speed			101	99%
Persistence			96	99%

Pigmentation Body
51% red — 32% dark yellow
53% covered — 33% spotted
Pigmentation Eyes
17% both eyes — 12% one eye

98 % Fleckvieh, 2 % Red Holstein

Evaluation of the progeny Number of the evaluated animals: –		relative figures for each trait 64 76 88 100 112 124 136	
Body	106		
Muscularity	98		
Feet & Legs	107		
Udder	121		
Cross Height	104	Small	Big
Body Length	109	Short	Long
Hip Width	104	Narrow	Wide
Body Depth	99	Flat	Deep
Pelvic Angle	113	Flat	Sloped
Hock Angularity	100	Posty	Sickled
Hock Development	98	Well-developed	Dry
Pasterns	105	Weak	Posty
Hoof Height	110	Low	High
Fore Udder Length	118	Short	Long
Rear Udder Length	99	Short	Long
Att. of Fore Udder	97	Loose	Firm
Suspensory Ligament	112	Not marked	Clear marked
Udder Height	106	Low	High
Teat Length	99	Short	Long
Teat Thickness	87	Thin	Thick
Teat Placement	142	Outwards	Inwards
Rear Teat Placement	118	Outwards	Inwards
Udder Purity	105	Added teats	Pure Udder

- ***Genomically tested bull***

BFG REUMUT *TA

10/850712

Born: 03/11/2009
Breeder: Lechner, Sauerlach
S: Raufbold 182946
D: Fiona 09.39842627
DS: Ruap 10/191085

Line: Redad

gTotal Merit Index	**134**	73%
Milk Index	**128**	71%
Daughters		
Milk-kg		+976
Butterfat-%		-0.03
Butterfat-kg		38
Protein-%		+0.00
Protein-kg		34
Beef Index	**108**	93%
Net Gain	106	
Dressing Percentage	106	
Carcass Conf. Score	108	

Fitness			**117**	71%
Fertility	2		97	52%
Calving Ease	118	99%	99	70%
Stillbirth	112	98%	116	60%
Productive Life			110	64%
Somatic Cell Count			113	69%
Milking Speed			109	71%
Persistence			93	71%

BFG ROSSKUR PS

Line: Redad

10/179513

Born: 04/19/2008
Breeder: Nickl, Trabitz
S: Ralmesbach 169545
D: Laura 09.39531433
DS: Merkur 10/184530

gTotal Merit Index	**128**	84%
Milk Index	**127**	87%
Daughters	42	
Milk-kg	2689	+1138
Butterfat-%	4.06	-0.05
Butterfat-kg	109	43
Protein-%	3.12	-0.06
Protein-kg	84	35
Beef Index	**102**	89%
Net Gain	100	94%
Dressing Percentage	107	76%
Carcass Conf. Score	98	92%

Fitness			**107**	74%
Fertility	-2		100	49%
Calving Ease	116	95%	94	74%
Stillbirth	113	87%	112	66%
Productive Life			104	65%
Somatic Cell Count			101	82%
Milking Speed			113	86%
Persistence			100	87%

Pigmentation Body
61% red — 22% dark red
43% spotted — 35% covered

Pigmentation Eyes
35% both eyes — 9% one eye

95 % Fleckvieh, 5 % Red Holstein

Evaluation of the progeny
Number of the evaluated animals: 45

			relative figures for each trait: 64 76 88 100 112 124 136	
Body	103			
Muscularity	95			
Feet & Legs	113			
Udder	96			
Cross Height	104	Small		Big
Body Length	104	Short		Long
Hip Width	101	Narrow		Wide
Body Depth	92	Flat		Deep
Pelvic Angle	97	Flat		Sloped
Hock Angularity	100	Posty		Sickled
Hock Development	110	Well-developed		Dry
Pasterns	110	Weak		Posty
Hoof Height	97	Low		High
Fore Udder Length	105	Short		Long
Rear Udder Length	122	Short		Long
Att. of Fore Udder	90	Loose		Firm
Suspensory Ligament	91	Not marked		Clear marked
Udder Height	93	Low		High
Teat Length	101	Short		Long
Teat Thickness	99	Thin		Thick
Teat Placement	87	Outwards		Inwards
Rear Teat Placement	94	Outwards		Inwards
Udder Purity	103	Added teats		Pure Udder

- ***Naturally polled***
- ***Milk yield***
- ***Calving ease***

ROTGLUT

Line: Redad

10/179589

Born: 10/01/2008
Breeder: Sauter, Biberach
S: Round Up 188325
D: Dirndl 09.39981592
DS: Winnipeg 10/182567

gTotal Merit Index	**138**	77%
Milk Index	**120**	78%
Daughters	1	
Milk-kg	2924	+675
Butterfat-%	3.89	-0.03
Butterfat-kg	114	26
Protein-%	3.23	+0.03
Protein-kg	94	26
Beef Index	**122**	87%
Net Gain	125	94%
Dressing Percentage	115	71%
Carcass Conf. Score	108	92%

Fitness			**125**	74%
Fertility	2		97	57%
Calving Ease	89	94%	116	71%
Stillbirth	94	87%	115	64%
Productive Life			121	67%
Somatic Cell Count			119	74%
Milking Speed			112	77%
Persistence			113	78%

Pigmentation Body
44% red — 40% dark red
68% covered — 28% spotted

Pigmentation Eyes
36% both eyes — 32% one eye

96 % Fleckvieh, 4 % Red Holstein

Evaluation of the progeny
Number of the evaluated animals: 25

			relative figures for each trait: 64 76 88 100 112 124 136	
Body	117			
Muscularity	115			
Feet & Legs	109			
Udder	115			
Cross Height	113	Small		Big
Body Length	120	Short		Long
Hip Width	114	Narrow		Wide
Body Depth	115	Flat		Deep
Pelvic Angle	102	Flat		Sloped
Hock Angularity	98	Posty		Sickled
Hock Development	92	Well-developed		Dry
Pasterns	117	Weak		Posty
Hoof Height	116	Low		High
Fore Udder Length	99	Short		Long
Rear Udder Length	96	Short		Long
Att. of Fore Udder	112	Loose		Firm
Suspensory Ligament	105	Not marked		Clear marked
Udder Height	109	Low		High
Teat Length	95	Short		Long
Teat Thickness	93	Thin		Thick
Teat Placement	110	Outwards		Inwards
Rear Teat Placement	97	Outwards		Inwards
Udder Purity	108	Added teats		Pure Udder

- ***Type traits***
- ***Fitness***
- ***Dual purpose***

98 % Fleckvieh, 2 % Red Holstein

Evaluation of the progeny		relative figures for each trait	
Number of the evaluated animals: 146		64 76 88 100 112 124 136	
Body	91		
Muscularity	91		
Feet & Legs	98		
Udder	103		
Cross Height	89	Small	Big
Body Length	98	Short	Long
Hip Width	91	Narrow	Wide
Body Depth	94	Flat	Deep
Pelvic Angle	86	Flat	Sloped
Hock Angularity	103	Posty	Sickled
Hock Development	101	Well-developed	Dry
Pasterns	95	Weak	Posty
Hoof Height	102	Low	High
Fore Udder Length	113	Short	Long
Rear Udder Length	109	Short	Long
Att. of Fore Udder	90	Loose	Firm
Suspensory Ligament	101	Not marked	Clear marked
Udder Height	89	Low	High
Teat Length	93	Short	Long
Teat Thickness	86	Thin	Thick
Teat Placement	107	Outwards	Inwards
Rear Teat Placement	110	Outwards	Inwards
Udder Purity	108	Added teats	Pure Udder

- ***Milk yield***
- ***Protein***
- ***Dressing percentage***

BFG SALVATOR

10/197088

Born: 08/05/2004
Breeder: Holzer, Diemendorf
S: Safir 184538
D: Lotte 09.32745209
DS: Husaldo 13/4811

Line: Streik

gTotal Merit Index	**121**	96%		
Milk Index	**133**	99%		
Daughters	113			
Milk-kg	6579	+980		
Butterfat-%	4.18	+0.04		
Butterfat-kg	275	44		
Protein-%	3.55	+0.14		
Protein-kg	233	46		
Beef Index	**105**	99%		
Net Gain	102	99%		
Dressing Percentage	111	98%		
Carcass Conf. Score	100	99%		
Fitness			**81**	90%
Fertility	1		87	73%
Calving Ease	102	99%	98	95%
Stillbirth	102	99%	113	91%
Productive Life			80	86%
Somatic Cell Count			90	98%
Milking Speed			94	99%
Persistence			102	99%

Pigmentation Body
54% red — 24% dark yellow
80% covered — 13% spotted
Pigmentation Eyes
14% both eyes — 8% one eye

96 % Fleckvieh, 4 % Red Holstein

Evaluation of the progeny		relative figures for each trait	
Number of the evaluated animals: 105		64 76 88 100 112 124 136	
Body	96		
Muscularity	88		
Feet & Legs	116		
Udder	110		
Cross Height	97	Small	Big
Body Length	96	Short	Long
Hip Width	94	Narrow	Wide
Body Depth	95	Flat	Deep
Pelvic Angle	106	Flat	Sloped
Hock Angularity	100	Posty	Sickled
Hock Development	118	Well-developed	Dry
Pasterns	107	Weak	Posty
Hoof Height	103	Low	High
Fore Udder Length	108	Short	Long
Rear Udder Length	119	Short	Long
Att. of Fore Udder	97	Loose	Firm
Suspensory Ligament	103	Not marked	Clear marked
Udder Height	97	Low	High
Teat Length	102	Short	Long
Teat Thickness	107	Thin	Thick
Teat Placement	108	Outwards	Inwards
Rear Teat Placement	112	Outwards	Inwards
Udder Purity	104	Added teats	Pure Udder

- ***Milk yield***
- ***Flat lactation curve***
- ***Fitness***

BFG ZAUBER

10/170014

Born: 08/18/2006
Breeder: Pilz, Kallmünz
S: Zahner 187899
D: Gracia 09.34569364
DS: Randy 18/68122

Line: Zander

gTotal Merit Index	**132**	94%		
Milk Index	**123**	96%		
Daughters	185			
Milk-kg	6781	+805		
Butterfat-%	4.36	+0.28		
Butterfat-kg	295	55		
Protein-%	3.44	+0.00		
Protein-kg	233	28		
Beef Index	**101**	98%		
Net Gain	100	98%		
Dressing Percentage	101	97%		
Carcass Conf. Score	102	97%		
Fitness			**120**	87%
Fertility	3		107	75%
Calving Ease	103	99%	100	90%
Stillbirth	107	99%	106	83%
Productive Life			114	80%
Somatic Cell Count			111	94%
Milking Speed			107	95%
Persistence			122	96%

Pigmentation Body
50% dark red — 45% red
53% covered — 31% spotted
Pigmentation Eyes
40% both eyes — 14% one eye

BFG GERMANICUS Pp

10/851003

Born: 02/28/2010

Breeder: Gutsverwaltung Seeseiten

Gigant	10/603047	Gorm	10/605012
		Hanka	14.00155410
48	09.35455328	Komet	10/403034
		17	09.18594093

Beef production

Calving Ease	104	76%
Stillbirth	101	62%
Beef Index	126	51%
Net Gain	124	57%
Dressing Percentage	107	42%
Carcass Conf. Score	129	52%

BFG STEINADLER PP

10/403084

Born: 03/05/2004

Breeder: Versuchsstation Neuhof

Sexed semen available!

Stachus	10/403054	Stakkato	13/1217
		Olga	09.12787057
Hitze	09.32115555	Emu	11/7624
		Humana	09.14218112

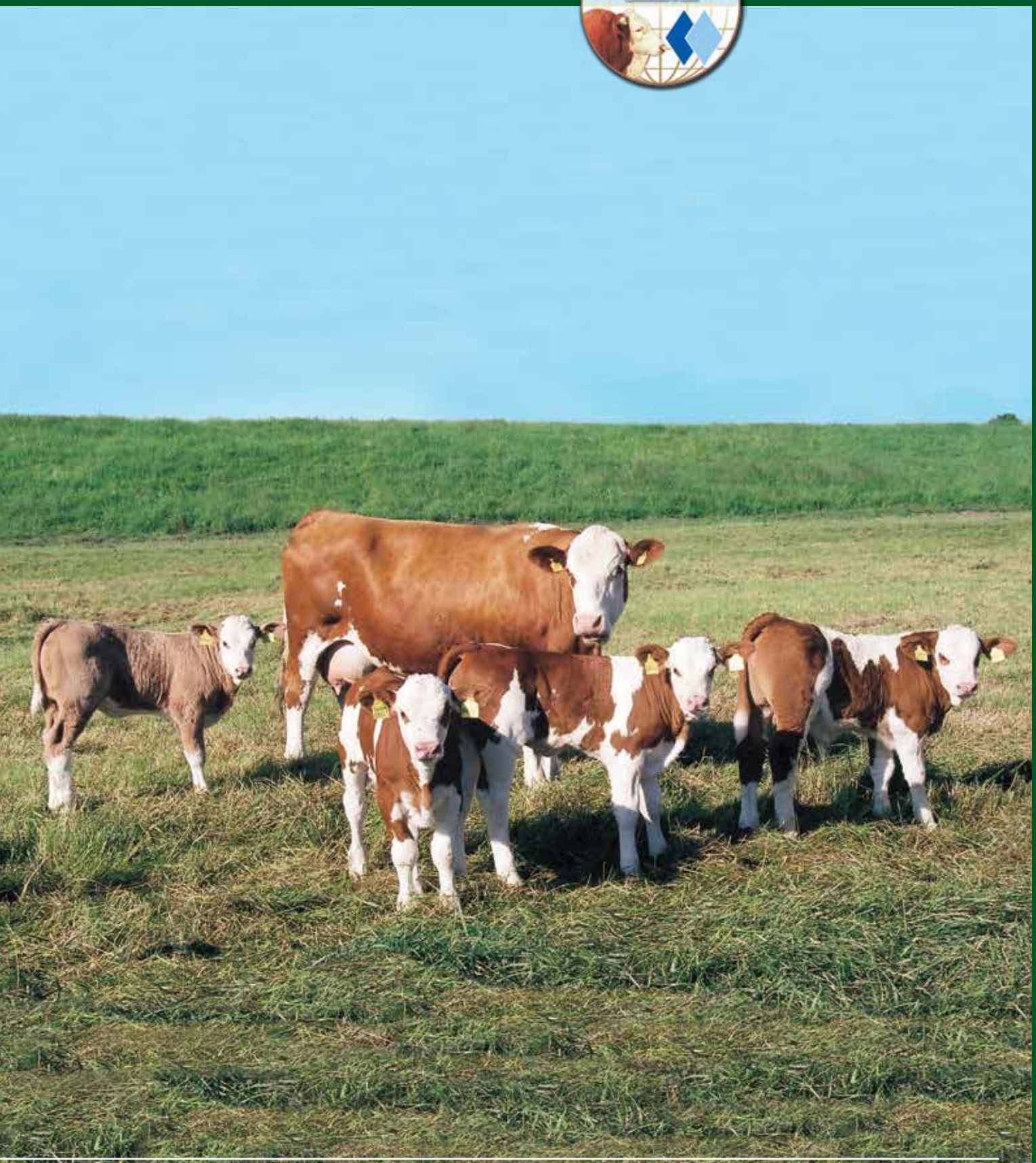
Beef production

Calving Ease	124	97%
Stillbirth	114	92%
Beef Index	123	97%
Net Gain	113	98%
Dressing Percentage	121	94%
Carcass Conf. Score	124	97%

Relative Beef Index	114	95%
Daily Gains mat.	107	
Daily Gains 365 days	105	
Muscling 365 days	110	

FLECKVIEH

for Beef-Production



The best Fleckvieh bulls for beef suckler conditions

♦ Peter Massmann, South Africa

A „blood-share" analysis I did five years ago on the Simmental-Fleckvieh population of Namibia and South Africa (hereafter Southern Africa, local name Simmentaler) showed a high proportion of Austrian and German Fleckvieh (hereafter Fleckvieh) blood which I believe it is the highest of all the non-European suckler populations. We can therefore accept that the Southern African performance evaluation is worldwide the largest for Fleckvieh under suckler conditions.

Our European readers must consider that worldwide you basically get two Fleckvieh genetic evaluations namely for suckler (cows not milked) and non-suckler (every cow milked) production conditions. Because of different breeding aims, traits evaluated differ and the weightings of the traits in a total merit index (TMI) differ dramatically. In the non-suckler Fleckvieh TMI kg protein+fat produced count 39 % were in the three TMIs of Southern Africa (Self Replacing Feedlot Index, Self-Replacing Grass Fed Index and Terminal Sire Index) milk 'in the bucket' or 'in the calf's stomach' counts nothing.

Who are the best **Fleckvieh** bulls imported from Austria and Germany? Based on the performance of their descendants in Southern Africa because being overseas artificial insemination (AI) bulls, their own performance did not contribute to their EBVs. The EBVs for the Southern African population are compiled by the Agricultural Business Research Institute, Australia (BREEDPLAN) which is the major provider of livestock recording and genetic evaluation technology in the world (120 breed societies in 12 countries). Apropos, Simmentaler was the first breed in Africa to join BREEDPLAN.

The leader bulls

The so called Trait Leaders are the best bulls based on performance. To qualify the bull has to stand out in the trait with a high EBV trait accuracy. For example there were nearly 18.000 sires in the analysis but only 100 qualified as trait leader for weaning weight and even less for the other traits. But how can we compare the progeny from these foreign AI bulls born over many years and subjected to different environment/management in Namibia and South Africa? It is worldwide acknowledged that EBVs/EPDs provide the best basis for comparisons of the genetic merit of animals born over years and reared in different environments or management conditions.

Easy calving

Under extensive conditions calving without any assistance is extremely important and is quantified by EBVs for birth weight (BW) and calving ease or the ease by which a sire's calves are born from two year old heifers. Worldwide research has proved that high birth weight is without doubt the main cause of calving problems or dystocia. The birth **weight** of a calf can be used as a guide-line for calving problems, but the birth weight **breeding value** is a far better predictor of calving problems since it can combine data from different sources.

Metro 17517 (Sire Metist 57501 > Meteor 59571/06) of the Greifenberg AI Station is a Trait Leader in both birth weight and calving ease with an EBV in the top 1 % of the breed. He is also in the breeds top third for growth, has the desired below average mature cow weight EBV and is a Trait Leader for scrotal circumference which is related to semen quality, quantity and early puberty of daughters.

I imported his semen because of good German calving ease values and an outstanding dam but most breeders did not like his picture and semen orders only picked up after his progeny was weaned. Luckily I was able to secure his last semen from the Bavarian „semen museum" which our breed association sold at a high premium (and profit). Of all the Fleckvieh bulls discussed here Metro has the most direct descendants and his line had a big influence in Simmentaler through Medur, Metaxas, Wisky, Hakbos Vuurslag (most famous Metro son) and Bayern-Genetics German-Africa testbull Massmann.

The second best Fleckvieh calving ease bull is Bayern Genetics **Wolfsblut** 188080 (Wespe 39773 > Horwein 21199) who is a birth weight Trait Leader and has a calving ease EBV in the top 10 % of the breed. I selected him to improve beef as well as milk to those who crossed with dairy breeds (his first lactation 350 milk recorded daughters: 5880 kg milk, 4.0 % fat and 3.4 % protein.) He has breeding values which you don't find often i.e. low birth weights (calving ease) combined with high 200 and 400 day weights in which he is also a Trait Leader. Besides that he also has a below average mature cow weight which makes him an ideal „growth-curve-bender".

♦ **Wolfsblut combines low birth weights with high 200-and 400-day weights.**

Growth

For this analysis I only considered Fleckvieh bulls **with at least two** growth trait leaderships. EBVs are provided for 200-day, 400-day and 600-day weight as well as carcass weight. One of the consequences of continued selection for increased growth EBVs is an associated increase in cow size leading to an increase in feed requirements and higher birth weights which are the main cause of calving problems. Therefore we prefer well above breed average weights together with an average mature cow weight and birth weight.

The 200-day weight EBV is a measure of an animal's early growth to weaning and is important for breeders producing bulls for commercial weaner production. A bull's 400-day EBV predicts the yearling weight of his progeny, the 600-days EBVs is important for slaughter oxen producers and the carcass weight EBV is an indicator of the genetic difference in carcass weight at a standard age of 650 days. Because of poor participation of local breeders in carcass trait recording I will not discuss the carcass traits (eye muscle area, marbling, rib and rump fat, retail beef yield and intramuscular fat).

No one would predict that a bull selected in Germany mainly for milk production would beat every other beef Simmentaler bull in Southern Africa on weights. This bull is Bayern Genetics **Eldorado** 2784310 (Elch 4499/13 > Egmont 32894/03) who is a 5-times growth Trait Leader in 200d, 400d, 600d and carcass weights as well as milk, all with very high accuracies. He justifies a separate article in this publication.

Bautz 207725 (Baum 47194 > Bayer 1295) from the Ba-

♦ **The bull Hasalz 24876 is a three-times leader in 200d, 400d and 600d.**

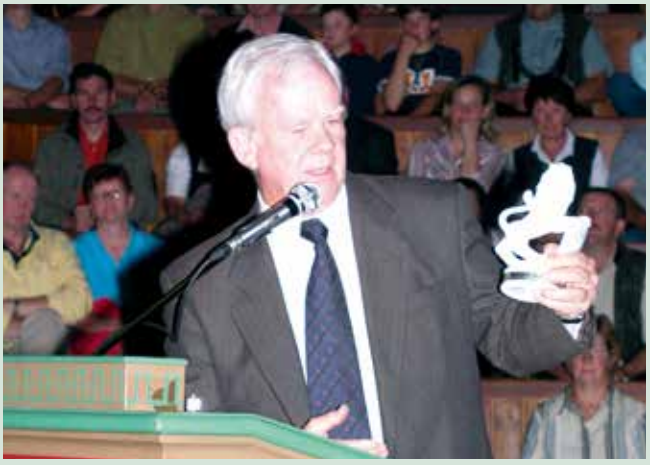
den Wuerttemberg AI station was selected in the 1980's by many breeders because he was a tremendously well-muscled beef bull. He is a 5-times leader in 200d, 400d, 600d, carcass weight and milk with an average calving ease. Popular close relatives used in Southern Africa are sire Baum, grandson Mont Beau Julius and Baldo, Balist, Balaton, Barabas and Balbo.
The Bayern Genetics bull **Hippo** 12392042 (Hodach 4969 > Hodscha 52964) is a 3-times leader in 200d, 400d and 600d but along with that good growth he breeds average cow size. Even though he was tested long ago he still has positive German milk and beef values with a high muscling value of 114.
Hasalz 24876 (Hahn 58094/07 > Halter 57142/07) also Bayern Genetics (Landshut) is a 3-times leader in 200d, 400d and 600d but could be better in calving ease. His most important son was Odensim Charles who won the „National BLUP show competition".

The Bayern Genetics polled bull **Eisenherz PP** 37194 (Eckholm 4105399 > Eckstein 79599) is a 3-times leader in 200d, 400d and carcass weight and his son **Exodus PP** 403066 (Bayern Genetics) is also a 3-times trait leader in 200d, scrotal size + carcass weight. They were both widely used in Southern Africa but are not recommended on heifers.
The most important locally bred sons are Hauk Erz P (4-times leader) by Eisenherz and Salerika Eksellent P (2-times leader) by Exodus. Both were licensed by our breed association as official AI bulls in Southern Africa. It is interesting to note that Eisenherz and Exodus have a German muscle score of 135 which is the highest I know of. However their German 'milk in the bucket' breeding value is exceptionally low.
Bayern Genetics **Wolfsblut** is a 2-times growth trait leader and was discussed above.
His half-brother Winnipeg is these days one of the most famous AI bulls in Europe with outstanding breeding values for milk (123), beef (114) and fitness (113) with over 3000 tested daughters and 120 sons at AI stations (April 2013).
The last growth leader is **Holb** 5465523 (Honig 5230 > Horex 2594) from the Baden Wuerttemberg AI station. He is a triple leader in 200d, 600d and daughters calving ease but his own calving ease is not good.

Weaning- or 200-day Milk

This is not based on the milk recording performance (measured-milk) but reflects extra calf weight at weaning which is due to the genetic influence a sire has on his daughters' milking and mothering ability (200d-milk).
The 200d-milk EBV is usually less accurate than growth EBVs because of the lower heritability of the trait and the time lag before the weaning weight of the daughter's calves becomes available. Based on experience gathered from the Bayern Genetics-Africa bull evaluation scheme we find that the 'measured-milk' and '200d-milk' breeding values differ very much which I believe are due to genetic X measuring method and genetic X environment interactions.
Bautz, slaughtered in Germany due to a lack of milk is in Southern Africa a milk Trait Leader and the Milk Trait Leader Eldorado has a very low measured-milk value of 79. On the other hand we have positive measured-milk bulls like Hippo (107) Westkap (107) and Viagra (102) that all have a 200d-milk value below breed average.

♦



♦ **In the 1970's Peter Massmann was German Fleckvieh's PRO for the America's, Africa, UK and Australasia. He served for more than two decades on the executive of the 28 member World Simmental Federation, organized three world congresses and is a livelong honorary member of the Federation. Appointed first CEO of Simmentaler Society South Africa/Namibia he took the society in three decades from a small society with no assets to the financially strongest and second largest in beef cattle registrations in Southern Africa. He has many international accolades.**

♦ **Thomas Grupp**

Eldorado, the best tested suckler-beef Fleckvieh bull

♦ Peter Massmann, South Africa

EBVs/EPDs are universally recognised as the best method to rank animals in terms of estimated genetic merit or in short how they breed in the measured traits. They have a huge advantage over indices/weights and that is that animals can be compared across herds and years within a breed and country or even countries in case of across-border analysis like in Namibia/South Africa and Australia/New Zealand. This basic concept is used here to compare the performance of the Bayern Genetics Fleckvieh bull Eldorado in important beef-suckler countries.

In the mid 1990's Dr. Thomas Grupp, the CEO of Bayern Genetics and I initiated a German-African bull-test program to

- introduce new Fleckvieh blood to local breeders at a cheap imported semen price
- progeny test beef characteristics of these bulls in Southern Africa (South Africa and Namibia) and Germany
- improve genetic linkage between herds to the benefit of the local genetic evaluation and
- finally test local „African Simmentaler bulls" in Germany which was unfortunately never achieved due to timeless EU semen/animal/embryo veterinary import restrictions from Africa.

Besides that, the breed association benefitted financially

♦ **Eldorado 27843 has proven his value in many countries.**

for many years by this program.
One of the bulls suggested by Dr. Grupp for the project was Eldorado. Eldorado was sired by Elch 4499/13 a very ordinary bull out of the Egmont > Egmar > Egon line which was not my favourite sire line but makes him an outcross sireline in Southern Africa.
Initially I was concerned to approve him for the project because the photos of Eldorado and especially his father showed me that they lacked that pronounced dry muscling we are looking and leaned more to the dairy side of this dual purpose breed. Nevertheless the appearance and the quality of Eldorado's mother convinced me to approve him for the project. She was a red covered cow sired by Metaxas 3718 from which we also imported semen and the half-brother of great beef Fleckvieh bulls Medur, Metro and Wisky. She had 9 calves and her average production is 8.988 kg milk, 4.3 % fat and 3.5 % protein. She is slightly line bred to the greatest Fleckvieh bull Haxl. Furthermore Eldorado had an impressive yearling weight of 730 kg which boils down to a daily gain of over 1.8 kg/day but his own and ancestry records are not reflected in the SA EBVs.

No 1 in growth

The Southern African (Namibia and South Africa) Simmentaler population has a high proportion of Fleckvieh and I believe that the Southern African performance evaluation is worldwide the largest for Fleckvieh under beef suckler conditions.
An EBV search with the informative BREEDPLAN search engine of the mentioned population (latest analysis 210 000 weaning weights) for top 1 % of breed percentile in weaning weight and growth to 400 days, mature cow weight (MCW) not in top ¼ of breed and milk in top ¼ of the breed displays only ONE bull and that is Eldorado. He is a five-times breed Trait Leader in 200 days or weaning weight, growth to 400d, growth to 600d, carcass weight (all in the top 1 % of the breed) and milk (top 10 % of breed). Because of the above mentioned bull-test program he was tested in many herds and his EBVs all have an accuracy of over 90 %.
I am happy that Edorado is not „up there" with his mature cow weight (increased feed requirement or input cost) and birth weight (calving ease) which makes him a sought after „growth-curvebender". These bulls are not common and known for high weaning and post-weaning weights to maximize the selling stage combined with around breed average cow weights to reduce maintenance energy input costs. For the record, compared to the breed his cow weight is not in the top quarter, birth weight in the average third and calving ease in the top 20 %.

The other side of the coin

Although these are most impressive figures they are just one part of bull selection. There are also important traits that are not expressed in EBVs like hair coat, feet and legs, muscularity and fleshing ability (some call it constitution) which tends to drop with increases in size and milking level. We found that easy-fleshing Simmentaler tolerate nutritional shortages more easily and therefore may reproduce more consistently. You still need visual appraisal to help make the right decisions and that it why every Simmentaler must be inspected visually by an expert and rejected animals are not registered in the herdbook.
In this regard I find the comment by Prof. D. Parrett very appropriate: „If animals are similar in type, genetics win, if they are similar in genetics, type wins. Genetics can't win if an animal is unsound. Type can't win if an animal has genetics that are way below breed average for important traits."
I am amazed how many bulls are selected these

days in important European Simmental-Fleckvieh countries for official artificial insemination on figures only and were appearance or type plays no role of any kind.

Adaptability of Eldorado's progeny

Adaptability is for example the ability of the progeny of a European Fleckvieh bull to adjust and thrive in the new African environment. A well-adapted animal is in harmony with its new environment which can be a production system like suckler beef production or „hardiness“ against adverse conditions. Poorly adapted animals cannot perform well which certainly is not the case with Eldorado's weight and milk breeding values which are based on the performance of his progeny in Africa.

♦ **Eldorado-daughters in South Africa. Eldorado progeny adapted very well to hot climates.**

Eldorado's performance in other countries

Simmental in Australia, Canada, New Zealand and the US are also not milked and kept for suckler beef production. Their genetic analysis includes growth/weight, 200-day weaning milk, calving ease and many carcass traits. In the below mentioned I only considered EBVs (North America EPDs) with an average to high accuracy.

Weaning and yearling weight: Eldorado is similar to Southern Africa (SA) a real leader and also in top 3 % of the breed in US, Canada, Australia/New Zealand (400d in top ¼).

Milk: In top 1 % of all the countries discussed here.

Mature cow weight: Not recorded in America and in Australia/NZ the same as in SA i.e. not in the top ¼.

Calving ease: Notwithstanding the high growth he ranks in the middle third in birth weight and calving ease in all the countries.

Milk: In all the countries in the top 1 %.

Although Brazil did not publish an EBV percentile chart to rank Eldorado's tested traits it is evident from the following that he is also in Brazil a true performance leader: He is the best of all the imported Fleckvieh bulls in 200 d, yearling weight, 550 d weight and maternal (milk) and a Brazilian Trait Leader in all these traits!

The cherry on top: I searched the large US database for all the types (purebred, fullblood, percentage) for calving ease in top 40 %, birthweight in best third and weaning, yearling and milk all in top 1 %. The result, only one bull named Eldorado 27843-10.

And then you get experts that believe in „Dual-purpose is no-purpose“.

♦

Bavarian Fleckvieh Genetics

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