

Danish Institute of Agricultural Sciences

Benefits to societys from research in select departments of the Danish Institute of Agricultural Sciences

Animal Breeding & Genetics and Horticulture

Case report

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Preface

This case report has been made by Kvistgaard Consult at the request of the Danish Institute of Agricultural Sciences (DIAS). The case report forms the basis and documentation of the main report of the analysis, which has been published separately. The primary data contained in this report have been gathered from March till June 2002.

The case report contains a total of nine cases, all of which relate to research projects at the department of Animal Breeding & Genetics and the department of Horticulture. The case report is the empirical basis of the main report, and consequently the main report gives the complete analysis of the nine cases. The methodical and theoretical considerations behind the case studies have also been described in the main report.

The reason for carrying through the analysis regarding benefits to society of the research at DIAS is that the management of DIAS has found it expedient to try to illustrate the benefit or the results of research at DIAS based on other and perhaps more significant indicators than those typically used. The indicators in question are mainly those illustrating the direct result of the research summed up by e.g. the number of publications, the number of patents and licences, the number of collaboration projects, the number of external collaboration partners, etc. No matter how useful these indicators may be in for instance contracts between public organisations, they do not deal directly with the results or the effects of research to society. What does research contribute in the form of increased turnover in the businesses, improved quality and animal welfare, reduction of environmental problems, education, and attention to the preparedness of authorities on a research basis?

It was the purpose partly to assess the benefits to society of select parts of the research, partly to test a concept which is to be used for this task. The results of this work appear in the main report, as the present report includes a summary of the results.

Prior to this report, a significant effort has been made by a number of DIAS employees and collaboration partners in order for the case studies to be produced. It has been possible for Kvistgaard Consult to do the task and get the present result only because of the immense support for the project from the parties concerned. For that support we are, of course, very grateful.

Yet, solely Kvistgaard Consult is responsible for the present result. Any error or omission can only be ascribed to our handling of the data and information made available to us. To the best of our abilities we have tried to carry through the analysis on a transparent and simple methodical basis, just as we have made it a point to be conservative in our assessment of the extent and significance of the effects. In our opinion, the results are therefore rather too modest than the contrary.

Finally, a special thank you is due to vice director Søren A. Mikkelsen, DIAS, who has contributed extensively to the development of the concept in his capacity of sparring partner.

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February 2003

Morten Kvistgaard

Summary

The purpose of this analysis was to map and assess the benefits to society of a few *select research projects* at The Danish Institute of Agricultural Sciences. For the analysis in question, 2 projects have been selected within 2 departments, the department of Animal Breeding & Genetics (Foulum, DK) represented by 6 cases, and the department of Horticulture (Aarslev, DK) represented by 3 cases.

It was also the purpose to develop and test a concept for the assessment of benefits to society from the DIAS research, a concept with the potential for further development, refining, and introduction as a management tool in the individual departments and at DIAS as a whole.

The 9 cases were selected in order to represent both the founding and strategic research as well as the application oriented research and development. The cases also cover both animal research and research within the vegetable area. Finally, the cases were selected in order through available data and information to be the subject of calculations assessing benefits to society. Moreover, a number of cases assessed early in their development process (e.g. ante assessments) are part of the project, as are cases assessed late in the development process (e.g. post assessments).

In each case of the analysis, we have illustrated *the benefits to society* of the research carried out. The benefits to society include on the one hand the quantified economic benefit of the research expressed in Danish Kroner, and on the other hand the qualitative benefit in areas, which we have not been able to quantify or value directly. In each case we have chosen to be conservative or cautious in our analysis and in the use of information, which means that the results reached are more modest than pretentious, if anything.

The main conclusion of the analysis is that research at the two departments selected, the department of Animal Breeding & Genetics and the department of Horticulture, respectively, is of significant benefit to society, partly through a specific, quantitative impact of both financial as well as environmental character, partly through a more sensitive and qualitative impact.

The economic benefit of the projects was assessed based on traditional investment indicators, such as internal rate of return and current value. Our conclusion is that the projects have an internal rate of return of 33% in average. And they generate current value equivalent to MDKK 840, a figure which in theory would provide capital for the total research at DIAS for 1½ years. If we leave out the case contributing the most to the total current value, the remaining 8 cases achieve current values of a total of MDKK 140, a figure which in theory would provide capital for the total research in the two departments for 1½ years. The projects relating to 6 of the cases achieve an internal rate of return comparable with the assessments listed in literature of internal rates of return achieved in international agricultural research.

Finally, the analysis shows that it is possible to develop a concept for the assessment of benefits to society from the research at DIAS, and that it is relevant to further develop the concept with a view to a general application as a management tool, in both de-central departments and their projects, and centrally in DIAS.

Compounds Beneficial to Health

Rosehip

Case 9

Horticultur

9. Rosehip's Compounds Beneficial to Health

Since 1999, DIAS has participated in a number of projects regarding rosehip's compounds beneficial to health. A particular focus has been on the soothing effect of rosehip on arthritis pains with a view to manufacturing a natural remedy for arthritis patients. The projects have been co-financed by Hyben Vital ApS, who manufactures and sells the product Langelands-Hyben.

Langelands-Hyben is so far marketed and sold as a general food supplement. In the assessments of the benefit to society of Langelands-Hyben, the use from this part of the sale is excluded.

9.1. Purpose

The main purpose of the project cluster is to develop a natural remedy against arthritis based on the active compounds in rosehip. The research technical purposes of the project cluster have been to document which active compounds have a soothing effect on arthritis, in order for a standardisation based on these compounds to be made and a certain protection to be achieved in connection with the certification of the product as a natural remedy, and to improve on the plant material and on a method of analysis of the active compounds. As a DIAS project, *Rosehip* is the overall designation of a number of activities or a cluster of sub-projects regarding rosehip as a compound beneficial to health/a natural remedy.

9.2. History

Table 1, item 9.3, lists the activities and sub-projects together with the activity number and/or the project identification number, grants, and grant giver/contributor.

The rosehip project cluster has three sub-divisions: A development project on the optimisation of growing conditions, selection of clones and the preliminary improvement (activity Nos. 5204(2) + 4508), a research project on the identification of the active compounds in the rosehip powder (activity No. 5545), and an analysis project on the establishment and validation of a gauging method for the active compounds (7922).

The development project (activity Nos. 5204(2) + 4508) is the examining the importance of the growing conditions in relation to the establishing of plant cultures, the yield, and the quality of the raw material. Also the genetic variation of the content of active compounds is examined, and the clones suitable for growth and with a large content of active compounds are selected.

The research project (activity No. 5545) is the identification of the active compounds in the product, the examination of the occurrence of the compounds in the fruit and their chemical/physical qualities, particularly the solubility and stability, and the patenting of the results of the research work and/or the publication in recognized scientific magazines.

The role of DIAS in the research project was to extract and separate the many different chemical compounds found in rosehip in order for the active compounds to be identified. The company Hyben Vital ApS will have a better possibility of guaranteeing the quality of the product and of protecting the results of the clinical research and thereby a better possibility of getting an approval of the product as a natural remedy with a predictable effect, which can be used in the treatment of arthritis by both doctors and alternative therapists.

The analysis project (7922) is a separate project for the development of a relatively simple method for extraction and quantification of the active compounds in the product (capsule/powder), a method which will make it possible to analyse a great number of product samples by means of a standardised method within a relatively short time. The project is also a validation of the analysis method according to the international regulations (the ICH guidelines: Volume 3A Guidelines, Medicinal products for human use, European Commission, 1998) the reason being a wish to ensure that the method can be reproduced/is valid when implemented in other laboratories. The validation of the analysis method will ensure that the amounts of active compounds measured are comparable from one gauging to another, a feature that will ensure the quality of the product. Moreover, the validation of the analysis method is an important part of the approval of the product as a natural remedy in Denmark and other countries. The project was made on behalf of the company Hyben Vital ApS, which has also financed the project 100% (see table 1). (Christensen, L.P. (2002) Validity of a quantitative HPLC method for the analysis of products containing fruits of dog rose (*Rosa canina* L.). Method No. DIAS HYBEN 1, date 22.03 2002, p. 1–19.).

Alongside the above tests, Hyben Vital International ApS has carried through a number of activities relating to the product Langelands-Hyben. A number of clinical tests made by Dr. med. Kai Winther et al. are mentioned below¹⁶. The tests show the subjects to have reduced pains, increased mobility, and a reduced intake of medicine. Within a 3-month period, the subjects had reduced their medicinal intake by 50 pct. on average. The perspective of the test is for those suffering from arthritis to be able to do completely without arthritis medicine in the long run.

The only product used in the test is Langelands-Hyben, which is produced from wild dog rose hips. Tests show that the product Langeland-Hyben has a very large content of compounds with an active effect on arthritis patients, as much as twenty times larger than the content of other rosehip products. For the moment a development project is carried out, and in a recently authorized improvement project starting in 2002, the improvement work will begin in order for the best rosehip plants to be used in the total production of Langeland-Hyben¹⁷.

The research project is carried out on behalf of the company Hyben Vital ApS as a collaboration between DIAS, the Copenhagen University Hospital (Arslan Kharazmi), and the Danish University of Pharmaceutical Sciences. I tabel 1 i afsnit 9.3 er aktiviteter og delprojekter anført med aktivitets- og/eller projektidentifikationsnumre, bevillingsbeløb og bevillingsgiver/bidragyder.

¹⁶ The tests concerned are so-called crossover, double blind and placebo controlled randomised clinical tests. This means for instance that all patients have been treated with rosehip powder as well as with placebo medicine (*Rosehip has impact, March 2002*).

¹⁷ Winther et al. 1999, Kharazmi & Winther 1999, and conversation with Dr. med Kaj Winther

9.3. Project Economy

Projekt Period: 1st October 1999 – 28th February 2001

Table 1: Projekt Economy for the Rosehip project cluster

Main project	Rose-hip		
<i>Activity No. Additional title)</i>	<i>Period</i>	<i>Grant – DKK</i>	<i>Contributor</i>
5204(2) + 4508 - Fruit production	1999-2004	475.000	Ministry of Food, Agriculture, and Fisheries
		714.389	Hyben Vital International ApS
5545 – Identification and characterization of active components.	1999-2002	367.000	DFFE (The Danish Directorate for Food, Fisheries and Agri Business) Product Development Fund
		367.000	Hyben Vital International ApS
7922 - Medicinal Plants	2002	149.650	Hyben Vital International ApS
The Main Project ALL IN ALL	1999-2004	2.065.039	

As far as DIAS is concerned, the 1998-2002 investments were used for the isolation of active compounds, whereas 1999-2004 were used for clone tests and growth tests, and in 2002 a method of analysis was completed.

The total R&D investment in connection with Hyben Vital exceeds the amount mentioned above. Torbjørn Hansen (director of Hyben Vital International ApS) estimates the *total* R&D investment at around MDKK 6, and the research effort of DIAS should therefore be compared to the total research effort to find the yield on the research.

9.4. The Market

Osteoarthritis is the most common disease of the joints and one of the most common diseases at all. As a matter of fact, all people get osteoarthritis sooner or later in at least one joint.

In Denmark, 3.8 percent of the population over 16 years of age have received the diagnosis of osteoarthritis, which corresponds to approximately 150,000 people. To this should be added that approx. 1 percent of the total population suffers from rheumatoid arthritis, i.e. 50,000 people (source: The Danish Rheumatism Association)

In the area of arthritis there is an extensive need for new and better treatments. Neither the pharmaceutical industry nor the health services are at present able to offer an adequate treatment. The “old” conventional drugs in the market, prescribed against rheumatoid arthritis, all have significant side effects. Recently a couple of new arthritis drugs have been released – under the trade names of *Remicade* and *Enbrel* – with purportedly reduced side effects. The side effects of the

arthritis drugs cause many arthritis patients to look for additional and supplementary remedies and forms of treatment, among which the rosehip products, which are natural remedies¹⁸ used by arthritis patients based on the well-documented assumption that rosehip will relieve the disease. A scientifically documented and natural compound based preparation against arthritis will therefore be interesting to a significant global market.

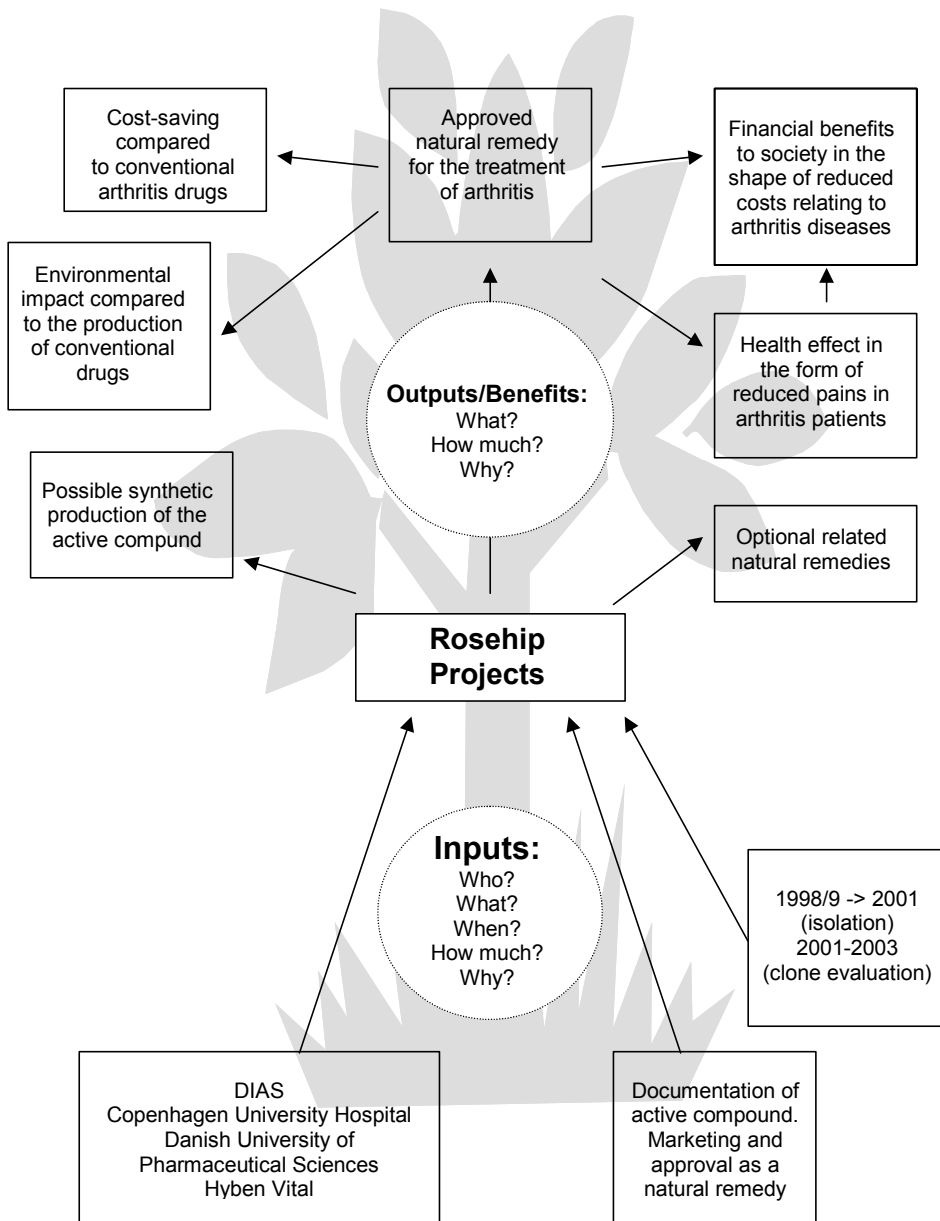
There are already a number of natural remedies on the Danish market, approved for slight pains or soreness to the muscles and joints. This goes for Gitadyl, Pagosid, and Sandoler (tablets), Ægte Venustorn (Devil's claw) (capsule), and Venustorn (Devil's claw) (herbal tea). In addition, three fish oil products have been approved for the soothing of morning stiffness and painful joints due to inflammatory diseases. This goes for Pikasol GI 60 (capsule), Nycoplus fish oil (Capsule), and Futura fish oil (Capsule). Finally, there are a handful of natural remedies for external use against slight aches or soreness to the muscles.

¹⁸ The effect of natural remedies must have been examined medically, but the documentation requirements are not as extensive as for "real" drugs.

9.5. The Product and its Benefits to Society

As mentioned before, Langelands-Hyben has a documented effect on arthritis patients, and is in particular used by people suffering from osteoarthritis (*Rosehip has impact*, March, 2002). Hyben Vital can be used as an alternative or as a supplement to conventional products.

The figure shown below gives a survey of the project and the potential effects.



The benefits to society from the use of the product – and thereby from the research behind the product – are equal to the advantages compared to conventional products. They can be divided into three types of effects:

- *Health effects* in the form of effects and side effects of Langelands-Hyben compared to conventional products.
- *Benefits to society* in the form of reduced prices on Langelands-Hyben compared to conventional arthritis drugs. To this should be added the possible socio-economic benefits in the form of an increase in employability in arthritis patients.
- *Environmental effects* in the form of a reduced impact on the environment by the manufacturing of Hyben Vital compared to the manufacturing of conventional preparations, and compared to conventional growth in the production fields.

With regard to the *health effect* of Langelands-Hyben, the research shows there to be no significant side effect by using the product. As mentioned previously, there are side effects to the use of traditional arthritis medication, even if the most recent conventional arthritis remedies on the market (*Remicade* and *Enbrel*) are estimated to have reduced side effects. With regard to the effects of Langelands-Hyben compared to other arthritis preparations, Langelands-Hyben has not been directly compared to other preparations in the research, but is estimated to have the same efficiency, with variations from patient to patient. With reduced side effects and the same effect to arthritis patients, there is a health benefit to society by the use of Langeland-Hyben (cf. conversation with Dr. med Kaj Winther). The valuation of this benefit depends on the value of reduced side effects in arthritis patients. No valuation of such a reduction has been made.

As previously mentioned, the socio-economic benefit depends on differences in costs of traditional drugs and Langelands-Hyben. The cost of a traditional arthritis treatment varies from around DKK 100,000 per annual patient (anti-TNF drugs) to a few thousand Kroner at the cheap end of the scale, where you find patients with diseases that require less medication. Prescriptions for the expensive anti-TNF treatment are given to only 150 persons, and other arthritis patients therefore get another and less expensive treatment (The Danish Rheumatism Association). In connection with this case, an estimate has been attempted to show the average drug costs for osteoarthritis patients with a view to calculating the benefits to society by the use of Hyben Vital. The Danish Rheumatism Association, the Danish Medicines Agency, pharmacies, doctors, etc. have been heard in this connection but without it resulting in the generation of documented, proven figures. Based on the views presented during the course of events, the amount has been fixed at DKK 1000 per month. The amount includes the *total* cost of medicine, i.e. both the patient's share and the share of the National Health Service or other health insurances. The amount should *not* be considered as an average, but is merely an estimate of the realistic medicine costs of an arthritis patient. Most likely, there are osteoarthritis patients with lower medicine costs and osteoarthritis patients with higher medicine costs. Nevertheless, the fixed amount will make it possible to make a rough calculation of the potential socio-economic benefits from Langelands-Hyben.

Each year, the recommended daily dosage of the Langelands-Hyben treatment costs around DKK 1000. If we assume, that this daily dosage reduces the medicine costs for osteoarthritis patients by 50 percent¹⁹, the use of Langelands-Hyben will reduce the medicine costs for an osteoarthritis patient by (12,000 – 6,000 + 1,000) a total of DKK 5,000 per year. If we assume that 50 percent²⁰ of

¹⁹ In the tests, the arthritis patients reduced their medicinal intake by 50% within 3 months. The calculation therefore assumes that the osteoarthritis patients, who use the Langelands-Hyben, will reduce their costs by 50%. A linear connection between quantity and price is therefore assumed. Thus, the possibility that the arthritis patients do not choose the cheapest version of their medicine but continue with the more expensive medicine is not taken into account.

²⁰ The calculation assumes that the development among arthritis patients will happen exponentially over the first 4 years and less during the 5th year, ending at 50 percent.

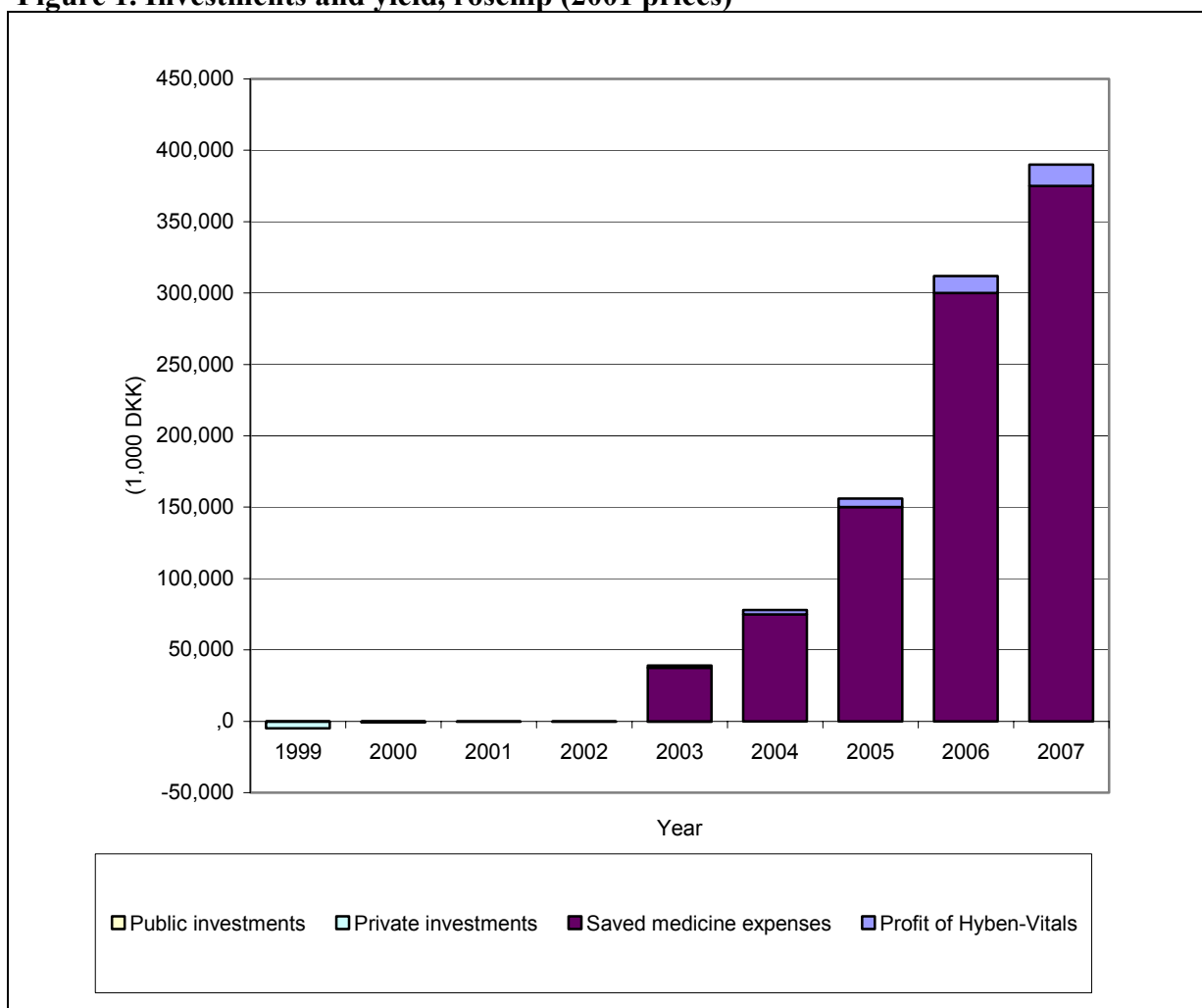
osteoarthritis patients will substitute half of the arthritis medicine with Langeland-Hyben over a five-year-period (in total 75,000 persons), the following prognosis can be made:

Table 2: Prognosis for the use of Hyben Vital

Year	2002	2003	2004	2005	2006	2007
Osteoarthritis patients using Langelands-Hyben	0.	7,500 (5 pct.)	15,000 (10 pct.)	30,000 (20 pct.)	60,000 (40 pct.)	75,000 (50 pct.)
Savings at society level	0	MDKK 37.5	MDKK 75	MDKK 150	MDKK 300	MDKK 375

The current assumptions being valid, the accumulated socio-economic benefits over a five-year-period will thus reach MDKK 937.5.

Figure 1. Investments and yield, rosehip (2001 prices)



If we include the R&D investments otherwise made by Hyben Vital ApS and amounting to approximately MDKK 4, the following key figures can be inferred (cf. appendix A). The figures show that the project pay-back will be attained within the first year:

- Internal rate of return 133 %
- Present value: Close on MDKK 700
- Pay-back: 1 year

The effect of Langelands-Hyben on rheumatoid arthritis patients is not as well documented as the effect on osteoarthritis patients, and the rheumatoid arthritis patients are therefore excluded from the calculations. It is, however, likely for the product to have a similar effect on rheumatoid arthritis.

Moreover, there may be *socio-economic effects*, if the Langelands-Hyben can attain better impact than the conventional preparations, for instance by the fact that a reduced number of side effects makes a more intensive and efficient medication possible. If we relate this effect to the fact that the social costs from osteoarthritis in the form of lost earnings are quite extensive, there are great benefits to be gained for a society if the Langelands-Hyben manages to make arthritis patients, who would otherwise have been unfit for work, return to the labour market. It is still too uncertain to say anything about the potential of Langelands-Hyben in that context, and these reflections have therefore been left out of the calculations. However, there is a potential effect, which can be included as a qualitative reflection.

As previously mentioned, the *environmental effects* depend on how the manufacturing of the different products affects the environment. The environmental effect of Langelands-Hyben seems to be at a minimum because the manufacturing of rosehip includes very little adjuvant. No fertilizer or manure is added, and the rosehip plant is a very hardy 20-year plant, which needs a minimum of attention. This fact results in potential benefits to the environment compared to the manufacturing of conventional arthritis preparations, and in environmental benefits compared to conventional farming of the same fields. It is therefore probable that there are in fact positive environmental effects from using Langelands-Hyben instead of other products, even if these effects have not been valued here.

As previously stated, a new remedy is expected on the market at a significantly lower price than the conventional synthetic preparations. This expectation is firm, in spite of the statutory equality implied by a natural remedy approval.

That the savings expected may be theoretical, can be explained by a number of factors as follows:

The new remedy will be an OTC-drug. In itself, this has a great number of institutionally conditioned implications, including a “bias” to the patients’ perception of the remedy as well as to the prescription practice of the doctors. As to the first, it cannot be ruled out that one group of patients will insist on getting the prescription drugs based on the assumption that prescription drugs are superior to OTC-drugs.

As to the latter, it cannot be completely ruled out that the requirement for prescription – in itself and due to the way in which the services of the doctors are paid – is a factor that positively correlates with the prevalence of any specific medical product.

Where doctors, in principle, have an obligation to prescribe the cheaper of two prescription drugs, the doctors have no obligation to refuse to prescribe a prescription drug, no matter if an approved natural remedy against the diagnosed disease exists (in this case: osteoarthritis)²¹.

On the other hand, it is quite conceivable that the marketing of the new, protected, and well-documented natural remedy will draw greater attention and, in particular, respect to the Langelands-Hyben and to natural remedies in general, and thereby increase the consumption of this products as well as other approved natural remedies, which also have positive effects to society, to some extent. This means that, in theory, a “snowball effect” may be the result with even greater benefits to society than those previously described, which are based on a view of the attitude among the population to today’s natural remedies.

9.6. Result Reliability

The results of the rosehip project calculations are quite outstanding, as no other project has had so extensive a potential of positive effects. The great benefits to society are caused by the existence of many osteoarthritis patients and the relatively high price of the traditionally used medicine. This information is relatively certain. However, it has been surprisingly difficult to get an estimate of the average medicine cost for each osteoarthritis patient. This is due to the fact that there are many types and degrees of osteoarthritis, and that it varies quite a lot, how much medicine the different treatments require. For the calculations, an annual amount of DKK 6,000 at a market share of 50% is used, which leads to a cost reduction for each patient of DKK 5,000 by the use of Langelands-Hyben. If this reduction is halved, the benefit to society will also be halved. But even half a benefit will still be very large (just under MDKK 400). We can therefore conclude that if the product has the effect expected, it is quite certain that benefits to society will be significant.

9.7. Conclusion

The *purpose* of the rosehip project cluster was to document which active compound is the soothing element on arthritis, in order for this compound to be the benchmark of standardisation and product development and in order to gain protection of a product through an approval as a natural remedy. Based on this, the main purpose is to develop and market a natural remedy against arthritis diseases based on the active compounds found in rosehip.

The *total costs* for the project cluster have reached approx. MDKK 6.1. Of these, around MDKK 5.1 have been privately funded, whereas the remaining project sum is public investment²². Based on the present assumptions, the most significant element of the project’s *yield* to society amounts to a total of MDKK 937.5 up until 2007 in terms of reduced costs for medicine.

²¹ The “concept of prescription” relates to the risk of damages if a drug is used incorrectly, not to the efficiency of a drug, which means that extensive side effects can be of advantage to a drug compared to just as efficient a preparation without significant side effect. In this way, it could be argued that the prescription system has certain consequences that are inexpedient from the point of view of the health authorities (or society).

²² We talk about public *investment* because it is agreed that DIAS, the Copenhagen University Hospital, and the Danish University of Pharmaceutical Sciences are to receive 4-5 per thousand of the turnover ex works as license fee.

Based on this, the internal rate of return of the project cluster will reach 133%, the present value will be around MDKK 700 during the same period, and the payback of the research investment will be almost immediate.

Socio-economically, the rosehip-project is without doubt the most profitable of the analysed projects. Particularly the present value is quite high, which is a result of the large savings attainable by a large part of the arthritis patients. The value attainable to the consumer is therefore especially high in this case, MDKK 669, but also the value available to the supplier of the rosehip product is estimated to be quite high (MDKK 21). The share available to research of present value is approx. MDKK -1. This value is exclusive of any license fees (cf. footnote 22), and is therefore presumably underestimated.

Under the assumptions mentioned, the Rosehip project cluster can be said to represent an efficient use of the DIAS research, which has even very large, long-term, socio-economic perspectives.

Certain potential benefits to the health area, to society, and to the environment have not been valued in the case. It is therefore most likely that the benefits to society are larger than illustrated by the figures mentioned above. The project cluster further represents a collaboration between DIAS, Hyben Vital International ApS, the Copenhagen University Hospital, and the Danish University of Pharmaceutical Sciences.

The project cluster is a good example of collaboration between trade and research institutions regarding applied research able to generate benefits to society within a short length of time.

9.8. References and Contacts

Contacts

Lars Porskjær Christensen, DIAS
The Danish Rheumatism Association.
Consultant doctor, Dr. med Kaj Winther, Copenhagen County University Hospital in Gentofte
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The Danish Medicines Agency
Torbjørn Hansen, director of Hyben Vital International ApS

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Annex A

Rosehip

(Kroner og pjees are in 1.000)

Inflation	2% (assumed for year 2002 and forward)								
Calculation rate/real interest rate	5%								
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Price index	0,95	0,98	1,00	1,02	1,04	1,06	1,08	1,10	1,13
Patients									
Rosehip, market penetration	0%	0%	0%	0%	5%	10%	20%	40%	50%
Osteoarthritis patients	150	150	150	150	150	150	150	150	150
Cost-cutting, ordinary medicine (DKK) at 6000 DKK/patient	0	0	0	0	46,818	95,509	194,838	397,469	506,773
Costs (DKK) at 1000 DKK/patient	0	0	0	0	7,803	15,918	32,473	66,245	84,462
Value of treatment	0	0	0	0	39,015	79,591	162,365	331,224	422,311
Hyben-Vital									
Sales revenue	0	0	0	0	7,803	15,918	32,473	66,245	84,462
Costs at 80%	0	0	0	0	6,242	12,734	25,978	52,996	67,570
Profit	0	0	0	0	1,561	3,184	6,495	13,249	16,892
Project costs									
Ministry of Food, Agriculture and Fisheries	-95	-95	-95	-95	-95				
Hyben Vital	-4,143	-143	-143	-143	-143				
DFFE	-184	-184							
Hyben Vital	-184	-184							
DIAS	-47,2	-47,2	-47,2						
Total, current prices	(4,652)	(652)	(285)	(238)	40,338	82,774	168,859	344,473	439,203
Total, fixed prices (2001)	(4,901)	(668)	(285)	(233)	38,771	78,000	156,000	312,000	390,000
Present value, fixed prices (2001)	(4,901)	(5,537)	(5,795)	(5,997)	25,901	87,016	203,425	425,158	689,125
Current prices, divided on type of source									
Public investments	-326	-326	-142	-95	-95	0	0	0	0
Private investments	-4,326	-326	-143	-143	-143	0	0	0	0
Hyben-Vital's profit	0	0	0	0	1,561	3,184	6,495	13,249	16,892
Saved medicine costs	0	0	0	0	39,015	79,591	162,365	331,224	422,311
Fixed prices (2001), divided on type of source									
Public investments	-343	-334	-142	-93	-91	0	0	0	0
Private investments	-4,558	-334	-143	-140	-137	0	0	0	0
Hyben-Vital's profit	0	0	0	0	1,500	3,000	6,000	12,000	15,000
Saved medicine costs	0	0	0	0	37,500	75,000	150,000	300,000	375,000
						0	0	0	0
						75,000	225,000	525,000	900,000
Pay-back time (year)	1	read							
Internal yield (current prices)	133%								
Present value, fixed prices (2001)	689,125								
Sector shares of present value									
Research	pct	(945)							
Supplier		21,503							
Consumer		668,567							

