Report to the
Government of Hungary

ISNAR R55

Agricultural Research in Hungary: Its Future Orientation, Organization, and Financing

A Discussion Paper

isnar International Service for National Agricultural Research

The mandate of the International Service for National Agricultural Research (ISNAR) is to assist developing countries in bringing about lasting improvements in the performance of their national agricultural research systems and organizations. It does this by promoting appropriate agricultural research policies, sustainable research institutions, and improved research management. ISNAR's services to national research are ultimately intended to benefit producers and consumers in developing countries and to safeguard the natural environment for future generations.

ISNAR offers developing countries three types of service, supported by research and training:

- For a limited number of countries, ISNAR establishes long-term, comprehensive partnerships to support the development of sustainable national agricultural research systems and institutions.

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ISNAR was established in 1979 by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international task force. It began operating at its headquarters in The Hague, The Netherlands, on September 1, 1980.

ISNAR is a nonprofit autonomous institute, international in character, and apolitical in its management, staffing, and operations. It is financially supported by a number of the members of the CGIAR, an informal group of donors that includes countries, development banks, international organizations, and foundations. Of the 18 centers in the CGIAR system of international centers, ISNAR is the only one that focuses specifically on institutional development within national agricultural research systems.

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A Discussion Paper

Sponsored by the EEC-PHARE Aid Implementation and Coordination Unit of the Ministry of Agriculture, Government of Hungary, Budapest

Executed by ISNAR, The Hague, in collaboration with Hungarian agricultural scientists

On behalf of the Science and Education Department of the Hungarian Ministry of Agriculture

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AGROVOC Descriptors:

research; organization of research; public research; research policies; agriculture; Hungary

CABI Descriptors:

agricultural research; government research; organization of research; research policy; Hungary

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FOREWORD

This discussion paper has been produced by a mission from the International Service for National Agricultural Research (ISNAR) consisting of Drs. Barry Nestel, John Coulter, and Cornelius Eerkens (on loan from the Government of the Netherlands). The work responds to a request to ISNAR from the Hungarian Ministry of Agriculture for a diagnostic review of the orientation, organization, and financing of agricultural research in Hungary.

Following a brief visit by Dr. Nestel in September 1991 to discuss the collection of data from research institutes and the program of work for the mission, the whole team visited Hungary from November 3rd to November 29th. During this period the mission travelled extensively within Hungary and visited a total of over 30 research institutes. Most were associated with the Ministry of Agriculture. They included research institutes, public enterprises with a research role, university faculties, or university research institutes. Three research institutes of the Hungarian Academy of Sciences were also visited. In February 1992 Dr. Nestel paid a further visit to Hungary to receive the comments of the Ministry of Agriculture and of Hungarian scientists after the report had been translated to Hungarian and circulated to them.

All of our meetings took place in an atmosphere of openness and frankness. Clearly the crisis facing Hungarian agricultural research at the present time has led to much deep and considered thought by those most concerned with this subject. We were fortunate to be able to draw upon their thoughts and experience.

Because the issues confronting agricultural research are complex and sometimes controversial, their resolution will not always be straightforward; for some issues a number of options might be considered. For this reason this report is a "discussion paper." We have attempted to respond to the request to write a "specific" report by being specific on certain key issues; but on others, where options exist, we offer "indicative" figures and examples rather than specific recommendations.

While we are firm in our recommendation for an apex body to coordinate and manage all national agricultural research in an integrated manner, there are several options as to how this might be achieved. We indicate what these options are, but the final choice will involve a number of factors which we are not able to evaluate. We have made a firm recommendation as to what might be the total magnitude of the national agricultural research budget. For illustrative purposes, we provide an example as to how this might be divided amongst institutes. The precise division of the budget must be a matter for national decision. Our goal has been to give an example of how this might be done, rather than to specify precisely what should be the outcome.

The report is organized in six chapters. The first gives a brief description of the current structure of the agricultural and natural resources sectors. Chapter 2 describes the current agricultural research system. Hungarian agriculture is currently in a stage

of transition and Chapter 3 discusses some implications for agricultural research. Chapter 4 indicates how Government policy for agriculture and agricultural research is changing to accommodate transition. In the fifth chapter the mission presents its recommendations and options for change in terms of research organization, management, and financing. In Chapter 6 we suggest a possible timetable for future action.

While the detailed content of this discussion paper will obviously undergo considerable change when local knowledge and skills are added to it, we hope that its overall structure will provide a basis for the fairly rapid formulation of a coherent research policy, particularly with respect to financing and organization.

ACKNOWLEDGEMENTS

This paper has been prepared under a contract awarded to ISNAR by the EEC-PHARE (Pologne-Hongrie: Action pour la Reconstruction Economique) Program.

The authors would like to express their thanks and appreciation for the help and support given by the staff of the Ministry of Agriculture - PHARE Program - Aid Implementation and Coordination Unit in Budapest. We are particularly grateful to Mr. A. Zichy for his wise counsel and guidance and for organizing the translation of the executive summary.

The mission is indebted to Dr. I. Gyürk, the Director General of Science and Education of the Ministry of Agriculture, for arranging such a comprehensive program. We are also grateful to Mr. A. Szende of his staff who organized the trip logistics, guided us throughout our travels, interpreted when required, cheerfully coped with all our requests, and, between meetings, gave us an introduction to Hungarian culture, architecture, and history.

We are also grateful to the directors and staff of the many institutes and universities that we visited for the generous way in which they received us, answered our barrage of questions, and extended their kind hospitality.

The final manuscript was typed by Willy Dooren, edited by Louise Côté, and reviewed by a number of ISNAR colleagues, particularly Rudolf Contant. Our thanks are due to all of them.

ACRONYMS

AGROINFORM	A State enterprise responsible until January 1992 for agricultural documentation and the National Agricultural Library
EED	European Economic Community
EUREKA	European Research Coordination Agency
GDP	gross domestic product
IAEA	International Atomic Energy Agency
ISNAR	International Service for National Agricultural Research
KISGV	Source of the core research budget of the Ministry of Agriculture
KMÜFA	Central Technological Development Fund
OECD	Organisation for Economic Co-operation and Development
OMFB	National Committee for Technology Development
OTKA	Hungarian Science Research Fund
PHARE	Pologne-Hongrie Action pour la Reconstruction Economique Program of the EEC
TKA	Additional funding source of the Ministry of Agriculture

ÖSSZEFOGLALÓ

1. Ezt a tanulmányt a mezôgazdasági kutatás irányvonalainak, szervezésének és finanszírozásának átvilágítása céljából a Magyar Kormány Földmûvelésügyi Minisztériuma (FM) felkérésére az ISNAR ("International Service for National Agricultural Research" - azaz a Nemzeti Mezôgazdasági Kutatást Támogató Nemzetközi Szolgálat) készítette. Az ISNAR munkáját az Európai Közösség PHARE Technikai Segítségnyújtás Programja finanszírozta, melyhez anyagi támogatást nyújtott a holland kormány is. Az ISNAR munkacsoportja 1991 novemberében négy hetet töltött Magyarországon. Ezalatt több mint 30 kutató intézetet látogattak meg az FM által elôkészített programot követve. Ezek között az intézetek között találhatók az FM kutatóintézetei, kutatási feladatokat végzô állami vállalatok, egyetemi karok és egyetemi kutatóintézetek. A munkacsoport a Magyar Tudományos Akadémia intézeteit is meglátogatta.

2. A munkacsoport érzékelte a mezôgazdaság és élelmiszeripar súlyát a magyar gazdaságon belül a bruttó nemzeti jövedelem (GDP), a foglalkoztatottság és az exportbevételek területén, és megállapították, hogy a növénytermelésben és az állattenyésztésben elért magas hozam annak köszönhetô, hogy a mezôgazdasági termelést magas szintû nemzeti technológiával támasztották alá.

3. A magyar gazdaság most a központilag tervezett gazdaságból a piacgazdaságra való átmenet idôszakában van. A mezôgazdaságban ez az átmenet az árpolitika változásában és az eddigi biztos piacok elvesztésében jelentkezik. További változásokat okozhat a nagy állami gazdaságok és termelôszövetkezetek privatizációja.

4. A gazdaság egészében és sajátosan a mezôgazdaságban végbemenô változások nagy mértékben befolyásolják a mezôgazdasági kutatást és kihangsúlyozzák egy erôs, a változásokat elôsegítô technológiai alap szükségességét. Figyelembe véve Magyarország tervezett belépését az Európai Közösségbe, ennek az alapnak a létezése különleges jelentôséggel bír, ugyanis a kutatásnak feltétlenül biztosítania kell a Közösség nagy igényeket támasztó minôségi és uniformitási szabványainak betartását, és ki kell alakítania a környezetbarát gazdálkodási technológiákat.

5. 1991-ben a magyar mezôgazdasági kutatást mind pénzügyi mind személyzeti csökkentés sújtotta. 1991 elôtt kb. 1400 teljes munkaidôs kutató dolgozott a

mezôgazdasági és további 200 az élelmiszeripari kutatásban. Az elôbbit szinte teljes egészében, az utóbbit kb. félig az állam finanszírozta. 1990-ben 2,2 milliárd forintot juttatott a mezôgazdasági és további 300 milliót az élelmiszeripari kutatás céljaira. Összehasonlítva néhány nyugat-európai országgal, ezek a számadatok a kutatók viszonzlag magas számát és a fizetések viszonylag alacsony szintjét jelzik a kutatás intenzitását meghatározó hagyományos mutatók értelmében.

6. 1990 óta nemcsak a nagymértékû infláció súlytotta a kutatóintézeteket, de az állami vállalatok által nyújtott pénzügyi támogatás is hirtelen lecsökkent, mely pedig jelentôs részét képezte a kutatás céljaira befolyt összegnek. 1991-ben a nyolc minisztériumi kutatóintézet belsô költségvetését 50%-al csökkentették, az akadémiai intézetekét 10%-al.További csökkentések várhatók 1992-ben. A mezôgazdasági és élelmiszeripari kutatás most nagymértékben alulfinanszírozott az anyagi és emberi erôforrások tekintetében, holott ezekre nagy szüksége lenne a magyar mezôgazdaságnak az átalakulás során felmerülô új feladatok megoldásánál és lehetôségek megragadásánál.

7. A kutatási rendszer egy másik fô kényszerítô tényezôje az, hogy hiányzik egy nemzeti mezôgazdasági kutatási politika, és egy, a prioritásokat meghatározó mechanizmus. A források elosztása nem prioritási rendszeren alapszik. Elôfordul átfedés, melyet súlyosbít a sokrétû finanszírozási forrás megléte. A munkacsoport által felkeresett kutatási igazgatók közül sokan hangsúlyozták a kutatási prioritások felállításának szükségeségét, melyek egy nemzeti kutatási stratégiához és egy stabil finanszírozási alaphoz kapcsolódnának.

8. A jelenleg létezô kutatási intézmények egy másik jellemvonása az, hogy hiányzik egy nemzeti rendszerbe való integráció. Az intézmények közötti közös kutatás korlátozott. Az intézeteken, fôleg az egyetemeken belül a kutatás gyakran nem feladat, hanem személy orientált, és sokszor kevés jelentôsége van a nemzeti igények szempontjából. Nem létezik olyan képviselet vagy szervezet, melynek feladata és hatásköre lenne a kutatás megtervezésének és megvalósításának bármilyen típusú integrációja. Ez a forrásoknak az optimálisnál kisebb mértékû felhasználásához vezet.

9. A magyar mezôgazdaságban jelenleg lezajló átmenet valószínûleg egy új típusú földtulajdoni formához és a mezôgazdasági kutatás eredményei új típusú felhasználójának megjelenéséhez fog vezetni. Egy új technológiaátviteli rendszer kialakítása válik szükségessé, mely lehetôvé teszi, hogy a kutatási eredmények

eljussanak a gazdálkodókhoz és azt, hogy meglegyen a felmerülô problémák visszacsatolása mind a kutatók mind kutatási stratégiák kidolgozói felé. Emiatt a jövendô kutatási stratégiáknak a jelenleginél még inkább piacorientáltaknak kell lenniük. Ahhoz, hogy ez megvalósuljon, egy erôs kutatási-szaktanácsadási kapcsolat kifejlesztésére és fenntartására van szükség.

10. A közelmúltban az FM kibocsájtott egy ágazati politikai tanulmányt és egy rövidebbet a mezôgazdasági kutatások témájában, mely részletesen meghatározza a mezôgazdasági kutatás feladatait. E tanulmány segíteni kíván a minisztérium által kitûzött célok megvalósításában. A cél nem az átszervezés vázlatának elkészítése volt, hanem inkább a problémák és lehetôségek elemzését kívánja nyújtani és egy olyan módszert javasol, melynek segítségével a magyar kutatási stratégiák kidolgozói és a kutatók megegyezésre juthatnak a jövendôbeli hatékony, egységes és stabil kutatási rendszer formáját illetôen. Ha nem valósul meg a fent említett konszenzus, a rendszer csak nagy változások árán fog tudni megfelelni a mezôgazdaság jövendô igényeinek.

11. Az anyag a kutatás többféle tipusát különbözteti meg: alap, stratégiai, alkalmazott és adaptiv/fejlesztô kutatás. A munkacsoport szerint széles területeket ölel fel a stratégiai és alkalmazott kutatásként definiált fogalom, melynek finanszírozása valószínûleg majdnem mindenkor állami feladat marad, fôleg jelenleg, mikor még a privát szektor nagyon kicsi és az átmenet problémái olyan nagyok. E tanulmányban a munkacsoport szemléltetés céljából felsorolt egy pár programot, melyekben valószínûleg az államnak kell játszania a vezetô szerepet a kutatásban.

12. Annak érdekében, hogy optimálissá lehessen tenni az állami források felhasználását, és hogy a mezôgazdaság és élelmiszeripar részére biztositani lehessen azt a technológiát és információt, ami a piacgazdaság viszonyaira való átálláshoz szükséges, a munkacsoport a magyar mezôgazdasági kutatási rendszer szerkezetátalakitását javasolja, valamint azt, hogy az egész rendszer egy csúcsszervezet felügyelete alá tartozzon. Egy ilyen csúcsszervezet lehet a minisztérium egy részlege, az akadémia vagy egy új képviselet,esetleg egy mezôgazdasági és élelmiszeripari kutatási tanács jelleggel. A fenti változatokkal kapcsolatosan a munkacsoport megvizsgálta az érveket és az ellenérveket és úgy találta, hogy a tanács típusú megközelítés lenne az optimális.

13. Függetlenül a választástól, a munkacsoport azt javasolja, hogy a csúcsszervezetnek mandátuma legyen a nemzeti mezôgazdasági stratégia

kifejlesztése és a kapcsolatos tevékenységek prioritásának meghatározása. Ki kell fejlesztenie egy intézményes irányítási kapacitást, mely lehetôvé fogja tenni, hogy kulcsszerepet játsszon a források elosztásának optimalizálásában a teljesebb integráció, a jobb monitoring és a kutatások jobb értékelése által.

14. Ennek az integrációnak ki kell használnia a három fô típusú, a kutatási rendszerbe foglalt intézet komparatív elônyeit. Az elsô típusba tartoznak azok a minisztériumi és az akadémiai intézetek, melyeknek legjobb a felszereltsége a mezôgazdaság által igényelt stratégiai és az alkalmazott kutatások elvégzéséhez. A második típushoz tartozik az egyetemi kutatás, mely talán a legjobban strukturált az alapkutatás viteléhez,(némi támogatással az akadémiai intézetektôl) és amely aa kutató állomások eszközein keresztül fókuszpontként szolgálhat bizonyos agroökológiai területek adaptív kutatása számára. Végül az országban szétszórtan található nagyszámú kutatóintézet, állomás és gazdaság lehetôséget biztosit egy egységesitett rendszer számára bizonyos számú agroökológiai csoport kiválasztására több terméket felölelô adaptiv kutatás céljára.

15. A mezôgazdasági és élelmiszeripari kutatási tanácsot vagy a más, kutatást koordináló csúcsbizottságot - hogy teljes mértékben betölthesse szerepét egy ilyen rendszer irányításában - azoknak kell vezetniük, akik nemcsak a hagyományos kutatási érdekeltségû szerveket képviselik, hanem a kutatás ügyfeleit is, akiknek egy része várhatóan a privát szektorból fog jönni.

16. A kutatási program irányitásához a felelôs képviseleti szervnek a kutatók egy kis csoportját szakoktatásba kell részesítenie, hogy ezek a személyek azután betölthessék a kutatásban a vezetô állásokat. Ezeket az állásokat olyan kipróbált tudományos képességgel rendelkezô kutatóknak kell betölteniük, akiktôl a további vezetôi és pénzügyi gyakorlat megszerzését is el lehet várni.Ahhoz, hogy ezeket az embereket meg lehessen tartani az állami szektorban, megfelelô karrierösztönzôkre van szükség.

17. A hazai mezôgazdasági kutatási szolgálat hatékony mûködéséhez egy megfeleló szintû és stabil finanszírozás szükséges, és kerülni kell a költségvetés válogatás nélküli csökkentésének ismétlôdését.. A munkacsoport úgy véli, hogy a minimális finanszírozási szint az 1990-es évnek megfelelô, konstans forintokba mérve. A kutatási eszközök és a kutatók számának korlátozott csökentésével, egy egységesített kutatási és finanszírozási rendszerrel lehetséges lenne egy, a jelenleginél sokkal rentábilisabb kutatási rendszer mûködtetése.Ehhez az

szükséges, hogy a kutatóintézetek pénzügyi szükségleteiknek mintegy 70%-át kapják meg garantált állami költségvetésként, és csak az ezen felüli részért "versenyezzenek", inkább, mint teljes költségvetésükért.

18. Többféle változat képzelhetô el egy egységesített finanszírozási mechanizmus megszervezésére. Ezek egyike az, hogy a jelenlegi kutatási összegek ekvivalensét egy ponton keresztül eljuttattjuk el az összes kutatóintézethez; a finanszírozás részben a termékek megadóztatása révén történne, és, rövid távon, igénybe kellene venni egy szerkezetátalakítási kölcsönt, mely segítene áthidalni az átmeneti idôszak költségeit.

19. Ha már meghatározták a nemzeti mezôgazdasági stratégiát és megegyezés született a végrehajtás prioritásait illetôen, nem lesz nehéz eldönteni azt,hol lesz szükség csökkentésre, ha elegendô pénzeszköz nem áll rendelkezésre. Ha ez a helyzet 1992-ben következik be még a nemzeti stratégia kialakitását megelôzôen, akkor néhány nehéz döntés meghozatalára lesz szükség. . Ilyen körülmények között a kutatási rendszer egészének a legkisebb kárt talán az okozná, ha a finanszirozás csökkentésére a következô sorrendben kerülne sor:

    1) Az állami támogatás nélkül is müködôképes intézetek, nevezetesen a Gabonakutató Intézet Szegeden, a Zöldségtermesztési Kutató Intézet és az FM Mûszaki Intézete,

    2) Az egyetemek kutatási költségvetése. Itt a csökkentések csak idôszakos károkat okoznának, mivel a személyzet és az eszközök az egyetem költségvetésébôl ffenntarthatók. Felvethetô néhány egyetem vagy egyetemi kar összevonása, ennek eldöntése azonban további vizsgálatot igényel.

    3) Amennyiben még a fenti lényeges csökkentések után is jelentôs pénügyi hiány állna fenn, akkor a nemzeti kutatási rendszernek okozandó, hosszú távon ható károk elkerülése érdekében a rendszer szerkezetében korai változásokat kell majd végrehajtani az 5. fejezetben tárgyalt irányelvek szerint, még mielôtt a stratégia meghatározására sor kerülne.

    A fentebb felsoroltaknál drasztikusabb bármely finanszirzás-csökkentés komolyan veszélyeztetné hosszú távon a nemzeti kutatási rendszert.

20. Ahhoz, hogy a tanulmányban javasolt változtatások megvalósíthatók legyenek, egy egyetértést szorgalmazó folyamatra van szükség. Ezek a következôkben való megegyezést foglalják magukba:

    a) egy egyesített, integrált - egyetlen csúcs-szervhez tartozó - nemzeti mezôgazdasági kutatási rendszer szükségessége;

    b) a rendszer finanszírozásának mechanizmusa (és szintje);

    c) a javasolt rendszer megszervezése, struktúrája és irányítása, beleértve a csúcsszervezet kapcsolódási módját is a rendszer különbözô elemeihez;

    d) a kutatási rendszer kapcsolódása mind a stratégia kidolgozóihoz, akik ezt finanszírozzák, mind a gazdálkodókhoz és más csoportokhoz, akik az ügyfelei.

21. A d) pont szorosan kapcsolódik egy új szaktanácsadási stratégia kidolgozásához. Nehéz lenne elszigetelve foglalkozni vele. Az a)-tól a c) pontig olyan ütemtervet javasolunk, mely lehetôvé teszi, hogy 1992 júliusáig egy koncepcionális végrehajtási tanulmány kerüljön a miniszter elé.

EXECUTIVE SUMMARY

1. This discussion paper is the result of a request from the Ministry of Agriculture of the Government of Hungary to the International Service for National Agricultural Research (ISNAR) to send a team to Hungary to conduct a diagnostic review of the orientation, organization, and financing of agricultural research. This request was supported by the PHARE Technical Assistance Programme of the European Communities and the Government of the Netherlands who jointly provided financial support for the review. An ISNAR team spent four weeks in Hungary in November 1991 during which time they visited over 30 research institutes. These included those associated with the Ministry of Agriculture as either research institutes, public enterprises with a research mandate, university faculties, or university research institutes. The team also visited agricultural research institutes of the Hungarian Academy of Sciences.

2. The team noted the important role of agriculture and the food industry in the Hungarian economy, in terms of their contribution to the gross domestic product (GDP), employment and export earnings. Agricultural producers have been assisted by their access to high-level indigenous technology. This has led to high yields for both plant and animal production.

3. The Hungarian economy is now in a transitional and orientation phase due to the change from a centrally planned to a free market economy. This has had important implications for the agricultural sector in terms of changes in pricing policies and the loss of previously secure markets. Further changes are expected to result from the privatization of large State farms and collectives.

4. These changes in the economy, and the agricultural sector in particular, have important implications for agricultural research, and highlight the need for a strong technological base to support change. This is of particular importance in the context of Hungary's planned entry to the EEC. Research will no doubt be required to meet the Community's demanding standards for product quality and uniformity, and for environmentally friendly farming practices.

5. Hungary's agricultural research system has suffered from funding and staff reductions in 1991. Previously about 1400 full-time scientist equivalents were engaged in agricultural research and a further 200 in food science research. Nearly all of the former group and about half of the latter were financed by the public sector. In 1990 it disbursed about 2.2 milliard forints for agricultural research and a further 300 million forints for research on food science. When compared with some Western European countries, these figures represent relatively high numbers of researchers and relatively low levels of costs per researcher in terms of conventional indicators used to denote research intensity.

6. Since 1990 there has been a high level of inflation, and financial support for research by public sector enterprises (which provided a significant part of total research income) has fallen sharply. In 1991 the core budgets of the eight ministry research institutes were cut by 50% and those of the academy institutes by 10%. Further reductions are anticipated for 1992. Agricultural and food industry research is now seriously underfunded in terms of the physical and human resources needed to meet the challenges and opportunities currently facing Hungarian agriculture in this transitional phase.

7. Another major constraint facing the research system is the absence of a national policy for agricultural and food industry research and of effective mechanisms for priority setting. Resource allocation procedures are not based on any system of clearly defined priorities. Duplication of effort exists and is exacerbated by the multiple sources of funding. Many research directors interviewed by the team stressed the need for a set of research priorities which were linked to a national research strategy and a stable funding base.

8. A further feature of the existing research establishment is its lack of integration as a national system. Collaborative research between institutes is limited, and within institutes, particularly the universities, research is often "person" rather than "problem" oriented. It is sometimes of limited relevance to national needs. No agency or organization has the responsibility or the authority to integrate research planning or implementation. This jeopardizes optimum use of resources.

9. The transition currently taking place in Hungarian agriculture is likely to result in a new type of land ownership pattern and the emergence of a new type of client for the research system. A new technology transfer system will be needed to disseminate research findings to farmers and to obtain feedback about new problems to researchers and policymakers. Future research strategies will need to be more market-oriented than at present. To bring this about strong research-extension links need to be established and maintained.

10. The Ministry of Agriculture has recently produced a sector policy paper and a shorter paper on agricultural research, which define the overall objectives for agricultural research. The present paper is offered as a contribution to the implementation of the goals proposed by the ministry. It is not intended to provide a blueprint for a reorganized research system. Rather, it analyzes problems and opportunities and suggests a process that Hungarian policymakers and the scientific community could use to reach a consensus on the future shape of an efficient, unified, and stable research system. Without such a consensus, major changes will be required if the system is to respond to agriculture's future needs.

11. The paper defines several types of research: basic, strategic, applied and adaptive. Much strategic and applied research is likely to remain a public sector responsibility, particularly at the present time when the private sector is small and transitional problems are great. The team has, for illustrative purposes, listed some of the programs in which the public sector should play the leading research role.

12. In order to optimize the use of public resources and to provide the agriculture and food industries with the technology and information required for re-orienting to perform in a market economy, the team has suggested that the agricultural research system in Hungary be restructured and that the entire system be responsible to one apex body. Such a body might be part of the ministry, the academy, or be a new agency, perhaps along the lines of an agricultural and food industry research council. The team has discussed the pros and cons of various alternatives and has favored the council-type approach.

13. Irrespective of the option chosen, the team recommends that an apex body should have the mandate to develop a national agricultural research strategy and to define its priorities for action. It should develop an institutional management capacity that will enable it to play a key role in optimizing the allocation of resources through better integration, monitoring, and evaluation of research.

14. Integration should capitalize on the comparative advantages of the three major types of institutes involved in the research system: (1) ministry and academy institutes that are well equipped to do the strategic and applied types of research for the agricultural system; (2) the university system which is, perhaps, best structured (with some support from the academy institutes) for conducting any necessary basic research and, through its research station facilities, is also capable of serving as the focal point for adaptive research in certain agroecological areas; (3) large numbers of research institutes, stations, and farms scattered throughout the country, which offer the opportunity for a unified system to select a limited number of agroecological clusters for multi-commodity adaptive research.

15. To fulfill its role effectively in managing such a system, the agricultural and food industry research council, or some other form of research coordinating body, will need to be governed by people who are widely representative of the agencies with traditional research interests, and also the clients of research, a number of whom may be expected to come from the private sector.

16. To manage the research program, it will be necessary for the agency responsible to provide management training for the small group of scientists who will fill its senior posts. Incumbents with proven scientific capability should fill these positions and be expected to develop further managerial and financial skills. To retain such people in the public sector it will be necessary to provide them with appropriate career incentives.

17. For a national agricultural research service to function effectively it will need to have an adequate and stable level of funding and to avoid the repetition of unselective cuts in budgets. The team considers that the minimum level of funding required in Hungary would be similar (in constant forints) to that provided in 1990. With limited reductions in the number of research facilities and scientists, and with a unified research system and funding agency it should be possible to operate a much more cost-effective research system than at present. This will require that research institutes receive about 70% of their

funding requirements as a guaranteed core budget and that they 'compete' only for the residue, rather than for their entire budget.

18. Various options are available for organizing a unified funding mechanism. They include channeling the equivalent to all current research funding through one point, (partially) funding research through commodity taxation and, in the short run, using a structural adjustment loan to help bridge transition costs.

19. Once a national agricultural strategy and operational priorities have been defined and agreed upon, there should be no trouble in deciding where cuts have to be made if funding is inadequate. Should this situation arise in 1992 prior to the establishment of a national strategy, some difficult decisions will have to be made. In such circumstances, perhaps the least damage to the research system as a whole would be made by reducing funding in the following sequence:

    1) Institutes that may be able to function without public sector support, namely the Cereals Research Institute at Szeged, the Vegetable Research Institute, and the Agro-Engineering Research Institute.

    2) The research budgets of the universities. Cuts here would do only temporary damage as staff and facilities could be carried on the university budget. A case might also be made for amalgamating some universities or university faculties, but this requires further study.

    3) If there are still major gaps in funding even after these substantial reductions, then in order to avoid the risk of permanent long-term damage to the national research system, it will be necessary to make early structural changes in the system, even before the strategy has been defined, along the lines discussed in chapter 5.

    Any reductions more drastic than this could risk serious long-term damage to the national research system.

20. **To implement the type of changes suggested, a series of consensus-building processes will be needed. These include reaching agreement sequentially on:**

- **the need for a unified, integrated national agricultural research system responsible to a single apex body;**
- **the financing mechanism (and level) for such a system;**
- **the organization, structure and management of the system proposed, including the way in which the apex body is linked to the various components of the system;**
- **the linkages of the research system to both the policymakers who provide its financing, and to the farmers and groups who are its clients.**

The last item is closely connected to the development of a new extension strategy. It may be difficult to proceed with this in isolation. For the first three items the team has proposed a timetable targeted at placing a policy paper for action before the Minister by August 1992.

CHAPTER 1

THE AGRICULTURE AND NATURAL RESOURCES SECTOR

1.1 INTRODUCTION

Hungary is a small country with a land area of 9.3 million hectares. Agriculture and forestry use 88% of this area. The rural sector provides a good social and physical infrastructure for agricultural workers, but there has been a steady decline in the size of the work force in agriculture and forestry. Agriculture currently employs about 13% of the national work force and the food processing industry about 7%. However, the agricultural labor force is likely to decline considerably as Hungarian agriculture approaches the labor use levels of Western Europe.

The size of the agricultural sector is illustrated by the fact that in Europe in 1987, Hungary was second only to Denmark in per capita production of cereals and third, after Denmark and Ireland, in per capita production of meat.

Agricultural exports represented about 20% of total exports (30% of total agricultural production and forestry). However, world market conditions have become increasingly more difficult and the collapse of markets in the previously secure German Democratic Republic and Soviet Union has led to a particular problem, especially for lower quality products. Market conditions have been difficult for several years and total agricultural production, which peaked in 1988, has fallen. This contrasts with an average annual growth of 3% to 4% in the gross agricultural output in the 1960s when the country was developing an increasingly export-oriented agriculture. Table 1.1 lists the major commodities in agricultural trade for 1989.

Table 1.1

Major Commodities in Agricultural Trade (1989)
(in millions of U.S. dollars)

Agricultural Exports	
livestock and meat	820
fruits and vegetables	368
cereals	269
vegetable oils	80
forest	135
TOTAL	2200 (23% total exports)
Agricultural Imports	
feedstuff	219
forest products	340
fish	64
fruits and vegetables	95
TOTAL	728 (8% total imports)

Source: FAO Trade Year Book.

One of the significant changes in government policy in the 1980s related to subsidies. Agriculture had previously been supported in net terms by the State budget, but the change in policy meant that contributions by agriculture to the State exceeded State subsidies to agriculture. Meanwhile taxes on the profits of large-scale agricultural enterprises increased from 40% in 1980 to 55% in 1985. However, between 1980 and 1987 subsidies to disadvantaged farms were doubled, accounting for one quarter of all agricultural subsidies. Such subsidies served both a social and production purpose.

More recently the structure of the agricultural production and food processing systems has been undergoing even more radical changes, with the formerly strong central planning system disappearing and a new private sector emerging. The well-defined linkages between research and producers of the former system have been disrupted. Because markets have changed so drastically and the cash flow crisis has deepened, the demand for new technology has declined and the strong financial support for research by the production and processing sectors has largely gone. Agricultural research is thus confronted with an uncertain financial future as well as technological challenges. The way to have some measure of control over the future is to develop strategies to deal with these uncertainties. A recent move in this direction has been the production of a sector policy statement (see Chapter 4).

1.2 THE NATURAL RESOURCES BASE

1.2.1 Soils

There is a wealth of detailed information on the distribution of soil types, some of which present a challenge for research. The Great Hungarian Plain, a drainage basin considerably water logged and with salinity and alkalinity problems, extends over roughly one third of the country. Soils affected by primary and secondary salinization are reported to cover 750,000 ha, and soils with poor drainage about 1,250,000 ha. The high water tables of the waterlogged areas present problems of salinity, pesticide, and nitrate accumulation. A considerable area in the east consists of poor sandy soils with low agricultural potential. These are poorly buffered and are subject to damage by acid rain: emission of air pollutants from within Hungary amounts to about 1.2 million tons of SO_2 and 280,000 tons of NO_2 per annum.

1.2.2 Rainfall

The average rainfall of the country is about 600 mm, but high summer temperatures, often exceeding 30 °C, mean that evapotranspiration exceeds rainfall in the summer months. About one quarter of the country is subject to drought. It is estimated that about two million hectares of cropped land could benefit from irrigation; the present irrigated area is around 200,000 ha, compared with only 30,000 ha in the 1950s. However, additional irrigation systems would necessitate substantial investments, particularly for drainage.

1.2.3 Forests

Much of the present 1.7 million hectares of forest is planted, with 800,000 ha afforested since 1949. About 70% of the forest land is controlled by the State, with most of the remainder in the cooperative sector. About six million m^3 (net) of wood is harvested annually.

1.2.4 Fisheries

There is no coastline in Hungary but there are 140,000 ha of inland waters. About 70,000 ha are found on State farms and approximately 23,000 ha are used as fish ponds. The total annual production of fish is about 34,000 tons, of which 23,000 tons are common carp.

1.3 AGRICULTURAL MANAGEMENT SYSTEMS

Some of the important features of the agricultural production system that determine the manner in which the present research organization is oriented and managed are set out in this section. Production was based on the management systems shown in Table 1.2.

Table 1.2

Land Use in Hungary about 1990

	No. of Units	Employees per unit	Average Area (ha)	Total Area (mha)
State Farms	133	945	7500	1000
Cooperatives	1400	400	4400	6230
Special Groups	62		1600	100
Private Farms	20,000	1	4.5	90
Households	1,500,000	0.5	0.5	750
Non Farm				1060
				9230

Sources: This table was made up from several sources, sometimes inconsistent and relating to the period 1989-91. The figures should be taken as indicative rather than 'exact'.

The household farms number 1.5 million, of which about one half operate part-time, and produce a variety of high value products, e.g., eggs, milk, vegetables, fruit, and pork. They have recorded a higher recent growth rate in production than the large-scale producers -- 47.5% from 1980 to 1987 compared to 27.3% by the large-scale producers. On the other hand, their labor productivity is much lower, being roughly one fifth or one sixth that of large-scale farming.

The production cooperatives number about 1400. They are involved in a wide range of activities, including considerable food processing. Their financial and technical management is mostly in the hands of university graduates of which some cooperatives employ a large number. The cooperative members themselves participate very little in management except in the specialized cooperatives. Members are reported to represent an aging population, with over 50% being pensioners in some of the enterprises. Only about 40% of the original owners from 1948 are now in the cooperatives, and the remaining 60% of the land is now under cooperative, indivisible ownership. Cooperative structures take many forms. Some of them represent integrated food systems in both scope and scale. About one third of their industrial activities are in the food industry where they play a major role in the agro-industrial complex. Many cooperatives have some form of symbiotic relationship with the owners of household plots. Both cooperatives and State farms may engage in private activities by offering contracts, leases, or services to individuals.

In the 62 specialized cooperatives that work almost 100,000 ha, members manage farms individually but cooperate for transportation, storage, machine use, advisory services, or specialized production, for example in fisheries and fruiticulture.

The State farms number about 130 including those in timber and forest enterprises. Their employees are wage earners like those in industry. Some of the State farms were designed to be used as models in the use of advanced technology.

In spite of the dramatic changes in agricultural management systems over the past half century, the cropping patterns have not greatly changed. The total arable land area now used for farming, gardens, orchards, vineyards, and pastures is about 6.5 million hectares. Cereals remain the dominant crop, covering 60% of the sown acreage. There have been few changes in either land area or crop mixture over the past 30 years. However, there have been significant changes in the planted area of some crops other than cereals: potatoes have dropped from 4.3% to 0.9% of the total planted area, while sunflowers increased from 2.8% to 8.4%. The structure of animal production systems has changed more radically over the past 40 years. The pig and poultry population has more than doubled, while cattle numbers have decreased by about 15%.

It is worth noting that all of the changes discussed above have taken place in the absence of a formal extension or advisory service although one is now in the process of establishment. In the past, the linkage between researchers and producers has either been direct to large enterprises or indirect through support services such as the seed testing enterprise.

The production pattern is related to the management system as Table 1.3 illustrates.

Table 1.3
Production by Large and Small Scale Farms (1987)

Commodity	Percentage of production contributed by:	
	Large scale farms	Small scale farms
Fodder	93.8	6.2
Cereals and leguminous crops	89.7	10.3
Industrial crops	88.5	11.5
Cattle	76.8	23.2
Poultry	56.4	43.6
Pigs	44.2	55.8
Grapes	40.3	59.7
Fruit	36.2	63.3
Potatoes	24.3	75.7
Vegetables	24.1	75.9

Source: Janos Juhasz: Cooperative Research Institute, Budapest

A large part of the production of major crops is on large farms where the farming system used is a very simple one with mono-culture or simple crop rotations. Household farms have much more diverse patterns of production.

A striking feature of Hungarian agriculture is its high yields and the manner in which they have increased over the past 3 decades (Table 1.4).

Table 1.4
Average Yields 1951-1985 (tons/ha)
Crop

Period	Wheat	Maize	Sugar beet	Sunflower
1951-55	1.46	2.06	18.69	1.07
1956-60	1.50	2.31	21.20	1.10
1961-65	1.86	2.61	24.64	0.96
1966-70	2.43	3.23	32.52	1.11
1971-75	3.32	4.17	33.00	1.24
1976-80	4.06	4.85	33.64	1.61
1981-85	4.63	6.11	38.90	1.98

Source: Varallay: State of the Hungarian Environment

The yields of wheat and maize, the two most important crops, are now the second highest in Eastern Europe. However, fertilizer use which was 211 kg nutrients/ha in 1988 fell to 121 kg/ha in 1991.

Past increases in yields have been brought about by the use of modern technology, machinery, fertilizers, and improved crop varieties. In maize production it has been calculated that of the increases in yield 30% are attainable to fertilizer, improved varieties for 28%, and weed control for 18%. Fertilizer use increased from 167,000 tons of nutrients in 1960 to 1.4 million tons in 1986; the dressing per hectare of cropped land increased from less than 50 kg/ha in 1960 to 260 kg/ha in 1986, with a fall in later years, particularly in 1991 when it fell to 121 kg/ha. A favorable summer and residual fertilizer effects prevented any dramatic drop in yields in 1991, but if fertilizer inputs remain reduced in 1992, yields can be expected to fall, especially on the poorer soils. In recent years the increased use of pesticide has been moderate, but the use of fungicides increased by 50%, and herbicide use almost quadrupled.

There is only limited scope for future yield increases, though the average yields of cereals would obviously improve if the poorer soils were taken out of production. Milk yields, about 6000 liters/lactation on the larger farms, are about the same as those on good farms in Western Europe. Food conversion ratios in pigs are below average, because of the shortage of protein in the diet. Drainage could increase crop yields on poorer soil. Drainage would also reduce salinity and facilitate cultivation and crop growth on waterlogged areas. Irrigation would increase yields of cereals in the drier areas but its economics appears doubtful.

In the past, the political and economic dimensions of production encouraged maximized production rather than optimized returns. Few research programs have used economic analysis, though there are probably enough response curves, particularly from fertilizer experiments, to calculate economic rates of return at different fertilizer, yield, and price levels. Higher quality feed would also improve the conversion ratios by pigs.

The picture that emerges from this description is that Hungarian agriculture is highly productive in a technical sense, though the use of inputs such as power, chemicals, and labor appears to be less efficiently managed and less integrated than in West European agriculture. Obviously, there are exceptions to this: some large-scale pig and dairy enterprises, for example, appear to use labor as efficiently as in livestock systems elsewhere. As will be discussed later, there is scope for productivity increases in some areas, but yield increases *per se* are not likely to be the primary objective in many farming systems in the future.

Thus, opportunities and challenges exist for the improvement of Hungarian agriculture. The emerging period of internal and international competition will require different approaches to old problems, and the formulation of new approaches to problems arising from a changing approach to production.

CHAPTER 2

THE CURRENT AGRICULTURAL RESEARCH SYSTEM

2.1 SCIENCE AND TECHNOLOGY IN HUNGARY

The Hungarian R&D system has been strongly influenced by the Soviet model. In this model, research remains relatively insular and apart from industry and education, although important steps to close the gap have been taken in recent years. Science policy distinguishes between science and technology development and funds them from separate sources. Science (basic research) is administered by the Hungarian Academy of Science and Technology by the National Committee for Technology Development (OMFB).

Over almost three decades efforts have been made to ensure an even balance between science and technology. This balance even extends as far as the higher echelons of the political system, where there is both a Minister without portfolio for science, and a Minister without portfolio at the head of the OMFB. Both are also members of the Science Policy Committee (reporting directly to the Prime Minister), the highest authority for science and technology.

Research is funded through several channels. There is a Hungarian Science Research Fund (OTKA) (until recently administered by the Academy) for basic research. Technology development is funded by OMFB through the Central Technological Development Fund (KMÜFA). The specialized ministries (such as Agriculture) also receive direct budget support for research. Research institutes in the past received much of their funding from contracts with State enterprises, although income from this source has fallen as the State enterprises move into a market economy. Some research institutes also receive funds from royalties, licenses and product sales, although emphasis in the latter area often channels resources out of research into production.

2.1.1 The National Committee for Technology Development (OMFB)

This committee was set up in 1964 to develop government policy on research and technology and to assist with its implementation. It also oversees the management of the Central Technological Development Fund (KMÜFA). The OMFB cooperates with all ministries or national institutes concerned with the development of technology.

OMFB has a secretariat and an Advisory Committee which prepares general lines of approach for technology policy, sets priorities, and suggests programs and levels of financial resources to be used for them. One third of the members of the Advisory Committee are representatives of specialized ministries, one third are drawn from professional associations, and one third are scientists.

A standing group of experts on technology, composed of scientists of international standing, as well as leading figures from the economic, industrial, and agricultural sectors, reports to the Committee and is responsible for reviewing the funding allocated by KMÜFA to the various programs, and for ensuring that the funding is managed properly.

2.1.2 The Hungarian Academy of Sciences

The Hungarian Academy of Sciences has close government links and in the past was the principal body responsible for formulating and implementing science policy. It has particular responsibilities for the coordination, control, and management of a number of research institutes, national research programs, and (until 31/12/91) the Hungarian Science Research Fund (OTKA).

The 10 scientific sections of the Academy, which are themselves divided into scientific committees, are entrusted with the task of developing scientific knowledge in their respective domains and of proposing ways in which the management and funding of research, as well as the research environment, might be improved.

The Academy has set up and supervises its own research institutes with the aim of promoting basic research. These institutes have full control over their research objectives, internal organization, and external relations. According to a recent OECD report, the Academy institutes comprise about two thirds of the R&D institutes which form the core of the national research system. The other third is under the control of specialized ministries such as Agriculture.

The precise role and funding of the Academy is currently the subject of study. The Academy itself and the Government are both reviewing this role in the context of proposals for reforming science and technology policy. One proposal under discussion is to combine the Academy and OMFB in a new Ministry for Research and Technology.

2.1.3 Specialized ministries

The specialized ministries (such as Agriculture) help to develop science and technology policy in the areas for which they are responsible. They are also responsible for the management of teaching and research institutions in their respective areas. The four ministries most closely involved with R&D are the Ministry of Industry and Trade, the Ministry of Agriculture, the Ministry of Transport, Water and Communications and the Ministry of the Environment.

The Ministry of Education, well aware of the role played by research in training, has endeavored over the past few years to develop research in the universities. An Act on higher education is currently being drafted which will increase the independence of universities with respect to curriculum and research activities.

2.2 THE STRUCTURE OF THE AGRICULTURAL RESEARCH SYSTEM

The R&D system in Hungary is large. In 1989 there were 35,000 scientists[1] engaged in public sector research. Of this number 22,000 worked on a full-time basis, and 3,200 were located in the 39 Institutes of the Academy of Sciences. During 1990 and 1991 a considerable number of researchers moved to the private sector and abroad. At the present time the number of full-time researchers has dropped to about 17,000. The ISNAR team estimated that about 1500 of these were working in more than 30 public sector institutes in agricultural or food science research.

Institutes involved in agricultural and food science research have been grouped by the ISNAR team into four categories:

1. Four research institutes funded by the autonomous Hungarian Academy of Sciences. They are mandated to do mainly basic research in plant, soil, and veterinary sciences; but they also supervise experiments at various field locations and generate funds from licensing fees and commercial activities. The need to generate additional revenue has given some of their programs a very practical and applied basis. The scientific staff of these four institutes totals about 180, and many have a degree equivalent to a Ph.D or higher.

2. Six agricultural universities supervised and largely funded by the Department of Science and Education of the Ministry of Agriculture. These Universities have 17 faculties situated in a total of 15 towns or cities throughout the country. They have both teaching and research responsibilities. Teaching appears to be the dominant interest at many university faculties, although most estimated that 30% to 40% of their time was devoted to research.

   The field research facilities of the universities include six research institutes, three of which deal specifically with viticulture and oenology. Faculty members total over 2000 with the equivalent of about 400 full-time researchers on the main campuses and 250 at the research institutes.

3. Eight research institutes funded primarily by the budget of the Ministry of Agriculture. These institutes manage over 4000 hectares of land. Their main role is in applied and adaptive research, but possibly 15% of their programs could be described as basic or fundamental research. Their total professional staff was about 450 in early 1990 but is predicted to fall to about 280 in 1992.

4. A number of institutes which carry out some agricultural research but are not necessarily included in the Ministry's core research budget. All, however, receive some KMÜFA funding through the Ministry. These institutes fall into several groups:

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[1]For a discussion of the definition of a scientist see p.12.

a) The Fruit and Ornamental State Enterprise and the Vegetable Research Institute are former research institutes of the Ministry of Agriculture. They were converted to Research and Development Enterprises, grow and market fruits and vegetables (seeds) respectively, and also conduct some research. Both secure a core research grant from the Ministry of Agriculture but generate most of their funds from commercial activities. Their total research staff is about 80 persons.

b) Two institutes, those for Geodesy, Cartography and Remote Sensing and for Agricultural Engineering, are primarily funded as Ministry of Agriculture "Services." Service activities generate most of their respective budgets, and the rest is provided by "research" contracts particularly from OMFB and OTKA. They provide services to both agro-industry and non agricultural agencies. Between them they provide over 40 person years annually to agricultural production and processing research.

c) One institute, the Research Center of the Seed Growing and Trading Enterprise, conducts plant breeding research funded by seed trading. The Center has a staff of 34 researchers and is attempting to join Debrecen Agricultural University. Some plant breeding research is also carried out by the Research Center for Agrobotany of the Institute of Agricultural Qualification. This agency is funded by the Ministry and looks after the national germ plasm collection.

We were advised that there is also a small private seed company conducting research in plant breeding in Hungary, but have no details on this.

d) Fourteen former Ministry of Agriculture Research Institutes are now State Enterprises working mainly on post-harvest technology (baking, milling, canning, wood technology, meat technology). None secures core funding from the Ministry of Agriculture. Two of these Institutes (sugar beet and tobacco) conduct production research and employ over 30 scientists.

e) Until 1992 the Ministry of Agriculture financed the Natural Agricultural Library and an Agricultural Research and Development documentation service, both of which were part of AGROINFORM, a State Enterprise. (In 1992 some of AGROINFORM's functions were taken over by the Research Institute for Agricultural Economics.)

f) The Ministry of Industry and Trade funds a small Research Institute for Medicinal Plants.

g) Environmental research at various locations is funded by the Ministry of the Environment.

While there is a theoretical division of labor among these various institutes, and some collaboration through joint research projects and contract research, the linkages are not strong and there is no central coordinating body.

In the past, the control of the Ministry of Agriculture over the work program of the institutes that it funds has been limited because of the lack of a clear national agricultural research policy or any system of monitoring and evaluating perfromance. However, it is now trying to exert more influence by placing more emphasis on budgeting through restricted content grants, rather than unrestricted core funding.

The Department of Science and Education in the Ministry has a staff of 33 of whom eight are concerned with the organization of research. Their work in the past was primarily in the administration and finance field, ensuring that Government policies and budgets were followed. Recently, the Department has been reorganized and has begun to take an active interest in research strategy and management, although its potential influence and impact are constrained by the existing structure of the research establishment.

2.3 PHYSICAL RESOURCES

The facilities in Hungary in which agricultural research is carried out vary considerably from institute to institute. In general, they are good at most Academy and university institutes, good to adequate at the main ministry institutes, and modest to limited at university research institutes and institutes receiving limited Ministry support.

2.3.1 Land

A number of research institutes have access to large areas of land, often far more than they need for research. Such land is often used for commercial purposes to produce crops or seeds, the revenue from which is used to support the research program. This procedure is not only used by State Enterprises such as those for Fruit and Vegetable Research, but is also adopted by Ministry, university, and Academy institutes. In many cases this procedure makes it difficult to differentiate research funding and personnel from non-research activities, although several institutes have made considerable efforts to do so.

2.3.2 Buildings

Although many institute buildings were constructed over 50 years ago, they are, in general, spacious, in good condition, and well used. Office space ranges from 200 m^2 to 4400 m^2 per institute, and laboratory space is usually in the range of 500 m^2 to 5000 m^2. Greenhouse, animal house, storage, and conference facilities were sometimes old but the utilization of facilities appeared to be good.

2.3.3 Libraries

All institutes attached considerable importance to information. They all had very satisfactory libraries as well as access to the National Agricultural Library in Budapest. A very high priority was given to journal subscriptions. Most institutes received over 100 journals (including key foreign ones) on a regular basis or had ready access to journals in a neighboring institute. AGROINFORM manages the National Agricultural Library which receives nearly 3000 journals on a regular basis through subscription and exchange.

2.3.4 Equipment

The most variable feature of institute facilities is laboratory equipment. Some institutes were superbly equipped with the most modern equipment. This had been funded from either a recent World Bank loan or from recycling funds from their commercial sales. A few institutes, particularly the six research institutes attached to universities, had limited modern equipment.

The maintenance and utilization of equipment was at a high level and much of the 10- or 20-year-old equipment was still in regular use (although some scientists complained that work done on outdated, albeit reliable, equipment was difficult to publish in some international journals).

There is no national coordination or strategy for equipment purchasing. Some institutes are more skillful than others in obtaining capital funds, particularly those institutes that have a large volume of sales. As a result, the use of scarce foreign exchange for equipment purchases may not always be optimized. However, in several cities (e.g., Debrecen, Szarvas, Sopron) institutes are voluntarily forming "associations" to share their most sophisticated equipment with each other.

2.4 HUMAN RESOURCES

The mission was impressed with the quality of scientific work carried out by agricultural scientists in Hungary in a wide range of disciplines and commodities. The high average yields attained nationally in both crop and animal production and the large number of Hungarian-bred crop varieties, used both in Hungary itself and abroad, are eloquent testimony to the quality of Hungarian agricultural research.

The ISNAR team attempted to assess the size of the human resource pool engaged in agricultural research in Hungary. This was difficult for at least four reasons.

First, the definition of a researcher varies from institute to institute in terms of academic qualifications. Some institutes regard persons with a first degree (or 5-year diploma) as assistants or associates rather than scientists or researchers. Some differentiate between the terms scientist and researcher. In its analysis, the mission has attempted to include every person with a university degree who is engaged in research as a researcher. At those universities where people may work part-time on research, we have endeavored to assess numbers in terms of full-time equivalents.

Second, it has sometimes been difficult to identify whether scientists were engaged in research or commercial activities. Some institutes make a clear distinction, and record and budget the two tasks separately. But most do not. On occasion people do both tasks.

Third, there are people with scientific training who are engaged full-time in administration. Where such administration is directly concerned with management of the research activities, we have tried to include such people as part of the research pool.

Fourth, the current crisis in research funding has forced some institutes, particularly Ministry research institutes and Enterprises, to cut back, sometimes substantially, on their staff in 1991. We have, therefore, based the numbers in the following table on our best estimates of researchers in mid-1990.

The table should, however, only be taken as indicative as the mission did not have the opportunity to discuss all of the figures prepared for it, nor to be sure that all data were recorded on a consistent basis.

Table 2.1

RESOURCES EMPLOYED IN AGRICULTURE RESEARCH IN HUNGARY IN 1990

TYPE OF INSTITUTE	NUMBER OF INSTITUTES	NUMBER OF RESEARCHERS	%
Academy of Sciences	4	180	12.2
Ministry Research Institutes	8	450	30.4
Universities	6	400	27.0
University Research Institutes	6	250	16.9
Fruits/Vegetables	2	80	5.4
Agro-Eng./Remote Sensing	2	45	3.0
Vetomag Seed/Germ Plasm	2	40	2.7
Sugar/Tobacco	2	35	2.4
	32	**1480**	**100.0**
Excluding Food Industry Researchers		1380	
OF WHICH (Excluding Food Industry Researchers)			
Academy	4	180	13.0
Ministry (Dept. of Sci. and Ed.)	19	1000	72.5
Other	8	200	14.5
	31	**1380**	**100.0**

In the firs' part of the table the figure for the Ministry and university research institutes includes 100 scientists at the Food Research Institute and the Horticulture University who deal with food processing. Food processing activities at the dozen or so other institutes (baking, canning, etc.,) have been omitted. Correcting for this gives 1380 scientists engaged in agricultural research. This is less than the figure of 2500 quoted to the mission by OMFB, although the latter figure may have included part-time researchers, scientists engaged in commercial activities at research institutes or scientists at the food processing research institutes. The figure of 1380 should be taken as a first approximation.

The bottom part of the table shows that over 70% of the scientists involved in agricultural production research were employed primarily at Ministry institutions (including universities), 13% at the Academy institutes, and only 14.5% at research institutes (mainly of the Ministry of Agriculture) associated with public enterprises.

A strong feature of the research system in Hungary is the excellent ratio of technicians to scientists in most of the laboratories visited by the mission. A shortage of technicians was not generally regarded as a constraint.

Nearly all of the scientists have been trained in Hungary. A small number have obtained post-graduate degrees abroad, and several have worked in other countries. But by and large foreign training has consisted of short courses and brief visits to other countries. The high quality of Hungarian agricultural research appears to be associated with the quality of the training in Hungarian universities. The mission was impressed not only with the breadth and scope of this training but also with its practical orientation, which gave students an excellent grounding for subsequent work on State or collective farms and in research institutes.

In the past there was a regular program of continuing education whereby graduates returned to the universities for refresher training every five years or so. This program appears to have lapsed. It is a worthwhile area that may need to be re-examined and reinstated, if former graduates are to be kept up-to-date with the new technology being developed for the changing structure of Hungarian agriculture.

2.5 FINANCIAL RESOURCES

Until 1989 over half of the funding for research and technology in Hungary was derived from public enterprises. The State budget provided a further 20%, and another 25% came from the Central Technological Development Fund (KMÜFA). Since 1989 research funding has come under considerable pressure. The State budget contribution was frozen and then progressively reduced, thus forcing research institutes to seek enterprise contracts and to engage in commercial activities. However, the general economic situation has caused State enterprises to reduce their support for research. Since 1985 KMÜFA has been largely financed by a levy on industrial profits, but as these have declined the KMÜFA income has also come under pressure. In 1990 KMÜFA received 10 milliard forints of which one milliard was allocated directly to the Ministry of Agriculture. This sum was used for investments, loans, studies, and other purposes, about 236 million forints of it was

allocated for research.

OTKA and OMFB both derive their funding from KMÜFA. Both agencies, and also the Ministry, now award research funds (including core funds) through a system of competitive bidding at the project level. From the total KMÜFA budget of about 10 milliard forints in 1990 the mission was quoted the sum of one to two milliard as being used by OTKA, primarily for basic research and equipment, and 6 to 6.5 milliard allocated to OMFB for development- oriented (adaptive) research. OMFB funds are usually given partially in the form of short-term (2- to 3-year) grants. This makes it difficult for scientists in fields such as biotechnology or soils research to submit appropriate proposals. Many scientists also complain that their applied research falls between the basic research and technology development mandates of OTKA and OMFB respectively, although both funds do seem to interpret their mandates with some degree of flexibility.

Projects may be submitted from any institute or university research institute to OTKA or OMFB for competitive bidding, without going through a line Ministry. Thus the Ministry of Agriculture has little control over the use of these funds. Funds from the Ministry itself are allocated by its high-level Research and Development Board with over 40 members, largely on the basis of recent historical shares of research money going to different disciplinary areas. For 1991, fifteen task forces (collegia) were established to cover the main disciplinary groups of research, each with about 20 members. Projects submitted by research institutes for Ministry funding were sorted under a contract awarded to a public enterprise, AGROINFORM, into their appropriate category. They were then considered by the relevant collegium which decided their priority for funding by the Ministry and OMFB, or rejected them. This system, in operation for just one year, is now being revised. The number of collegia has been reduced to 11; AGROINFORM has been reorganized, and a small permanent staff is being retained under a Ministry contract to maintain a data base and improve accountability. In this way the Ministry is attempting to manage research in an institutional framework, although it will only control a small part of the total research funding.

The team found it difficult to be certain of the total magnitude of Ministry support. We were advised that there are at least three sources of funds that the Ministry uses for financing research. One of them (KISGV), which provides the core budget for the eight principal Ministry research institutes, was reduced from 617 million forints in 1990 to 317 million in 1991 (although a reserve of 130 million was later provided to help fill the gap). A second source of funding (TKA) increased its contribution from 150 million forints in 1990 to 165 million in 1991, and the third (KMÜFA) rose from 236 million to 388 million during this period. TKA and KMÜFA funding is used for research at the universities and their research institutes and also for State enterprises with a research role. The total funding from these three sources was recorded at the Ministry as 1.003 milliard forints in 1990 (of which 270 million went to the universities) and 670 million to research institutes).

But this is not the total contribution of the Ministry to research. The universities pay most of their salaries from a core grant for education and the professors paid by this spend about one third of their time conducting research, so that perhaps another 400 million Ministry funds channelled to the universities for teachers and equipment is actually used for research. Approximately 200 million forints for agricultural research is also provided to its agricultural research institutes by the Academy.

From the responses of individual institutes to a questionnaire from the mission, we estimate that about 800 million forints of additional net research income was derived from OTKA, OMFB, licenses, royalties, earnings from the sale of crops and livestock, and contracts from public enterprises.

Actual earnings were much larger than this (perhaps of the order of 2.5 milliard forints) because some institutes were heavily engaged in commercial activities. The Vegetable Research Institute (a public enterprise), for example, had a turnover of 400 million forints with a profit of 50 million to 70 million, of which 21 million was used to support research. Likewise, the eight core Ministry research institutes had a 1990 turnover from contracts and sales totalling over 1.7 milliard forints, but research revenue was less than half this sum.

We were not able to obtain sufficient information to divide the research revenues accurately between their various component sources. Thus, our analysis of the funding of agricultural research should be taken as a first approximation that the Ministry might usefully refine at a later date.

At the time of our visit total funding for 1991 was not available although it was known to be well below 1990 for which expenditure was of the following order of magnitude:

	(Forints in millions)
Ministry (KISGV/TKA/KMÜFA)	1,000
Ministry (through University education)	400
Hungarian Academy of Sciences	200
OTKA/OMFB/other contracts	200-300
Commercial activities/royalties, etc.	500-600
	2,400

Of this sum about 200 million forints was used for food research. It was suggested to us that perhaps a further 100 million was invested in research in the food industry through former research institutes of the Ministry of Agriculture, that were now State enterprises in areas such as milling, brewing, baking, etc.

On this basis the identified (public sector) investment in agricultural and food industry research in Hungary in 1990 was of the following order of magnitude:

Agricultural research	2.2 milliard forints or 0.76% agricultural GDP
Food industry research	300 million forints or 0.48% food industry GDP

These figures represent about 8% of total national R&D. This is less than half the contribution that agriculture and food science makes to the GDP. Given the importance attached to the industrial sector, this may be understandable. However, it should be noted that for a country as developed as Hungary, the annual expenditure on agricultural and food research is low by international standards. It appears to have declined since 1990, so that the current cause for concern about research funding is well justified.

2.6 THE MANAGEMENT OF RESEARCH

In its present state the Hungarian agricultural research system is uncoordinated, unplanned, underfunded, and marginally over-staffed. It is not a coherent system but a conglomerate of separate institutions dispersed administratively among several agencies, and spread geographically across more than 50 research institutes, laboratories, and experiment stations (with an additional 15 or more institutes in agro-industry). There is no specific agency or institute which has a total picture of all existing or planned research.

A few years ago most of the key institutes concerned with agricultural research belonged to the Ministry of Agriculture which controlled most of the funding for agricultural and agro-industrial research. But for various reasons, mainly financial, the Ministry has and is still being forced to divest itself of research institutes by handing them over to the universities, the Academy, or converting them to public enterprises. The Ministry is no longer the dominant force in funding agricultural research. Finance is provided by OMFB, OTKA, the Academy, and public enterprises, and, increasingly, by patents, licenses, and the sale of crops, seeds, and livestock. Each funding source has its own agenda and there is as yet no comprehensive national agricultural research strategy with medium- and long-term horizons as a framework for developing programs geared to national priorities. The Ministry, OTKA, and OMFB all have their own criteria for project selection, although these are often not clear to the research institutes.

At a number of research institutes, particularly within the universities, there is a highly individualistic approach to priority-setting and program formulation, with each scientist developing his own proposals independently. Thus, a lot of research tends to be "person-oriented" rather than "problem-oriented", a situation that is encouraged by the award policies of OTKA and OMFB. There are notable exceptions to this in institutes such as Martonvasar and the Biotechnology and Fisheries Research Institutes where there are multidisciplinary problem-oriented institutional programs. In some institutes, of both the Ministry and the Academy, there are Scientific Advisory Boards to assist in research programming, but many institutes lack this type of guidance.

The Ministry of Agriculture has established an R&D Committee and a series of 11 "collegia" to assist in priority-setting and program formulation. But there is controversy about the effectiveness of both of these. It was suggested to us that the R&D Committee, with about 40 members, was too large to set priorities and met too infrequently to provide a research strategy or focus. The collegia were criticized as being "disciplinary" rather then "problem-oriented" with conflict of interest issues affecting the decisions of some groups. Some researchers were critical of the main R&D Committee on the grounds that it took little heed of the advice of the specialist collegia.

Table 2.2 shows how the Ministry allocated funding for research in 1990. The 1990 allocations were based on the pre-1990 historic allocation pattern of funding and used as a guideline for 1991. The data include funds given to many institutes other than the eight principal research institutes of the Ministry, including the universities. The rationale for basing fund allocations on past practices is questioned by the review team, particularly in the light of the changing research needs of Hungarian agriculture.

Table 2.2

ALLOCATIONS OF MINISTRY OF AGRICULTURE
RESEARCH FUNDS IN 1990

PROGRAM	Millions of forints	%
1. Soil fertility	85.8	8.6
2. Crop production	151.5	15.1
3. Horticulture	78.6	7.8
4. Animal production	182.6	18.2
5. Food processing	89.8	9.0
6. Animal health	8.1	0.8
7. Plant protection	9.4	0.9
8. Germ plasm	13.8	1.4
9. Agricultural engineering	54.8	5.5
10. Land surveying	24.0	2.4
11. Forestry, wood industry	69.7	7.0
12. Wildlife and fisheries	40.6	4.0
13. Agricultural economics	66.7	6.6
14. Information in agriculture	21.9	2.2
15. Biotechnology	97.0	9.7
	1003.1	100.0

As with planning, priority setting, and program formulation there is as yet no formal system for monitoring and evaluating progress, and assessing impact. The peer review system of electing members to the Academy of Sciences and the large number of papers published in peer reviewed international journals testify to the quality of Hungarian agricultural science, as does the role that some Hungarian scientists play in key technical committees of international agencies. There is also little doubt that the results of Hungarian research have had an impact on agricultural production, as can be seen by the high yield levels obtained for many crops.

Past progress has, however, been obtained with the help of State farms and cooperatives which were able to implement change on a large scale and whose goal was to increase yields with limited regard to cost. Attempts are now being made to restructure these large enterprises, and the emphasis in agricultural production is moving away from maximizing yields towards stressing cost efficiency, improved product quality, and better natural resources management. There are currently no criteria for evaluating research performance in these terms.

These brief observations lead the mission to the conclusion that current management procedures will need to change in order to make research activities and programs more cost-effective in a restructured agricultural sector. In order to modernize and restructure the research system to cope with the agriculture of the future, a number of existing constraints will have to be addressed.

2.7 OVERCOMING CONSTRAINTS TO RESOURCE USE

To develop a national agricultural research strategy there will need to be specific goals, priorities, and budgetary requirements, coupled with the recognition that:

a) There is a fundamental realignment of policy taking place in Hungary with emphasis on private farms and economic efficiency rather than maximization of yields.

b) There is currently only very limited private sector activity in agricultural research; thus, in the immediate future the public sector (including the universities) will have the prime responsibility for technology development and transfer.

c) Public sector research activities are already stretched to the limit in terms of the number and size of research institutes existing on hand-to-mouth funding. Some institutes are conducting the type of basic research that is scientifically interesting but of limited practical importance. Decisions are needed as to how much of this type of research is affordable in terms of national economic goals.

Because of the current financial instability in the agricultural research system, much research is being funded on a project basis with fixed (overhead) costs being drawn from project budgets. Survival rather than impact is the prime goal of many institutes, and some of them devote more effort to their commercial, income-generating activities than to

research. There is intense competition for funds and only limited cooperation or collaboration between institutes. Thus, some institutes collaborate with foreign partners rather than with other national institutes in sharing complementary expertise.

Both the Academy and the Ministry have institutes dealing with the breeding, genetics, and physiology of cereals. In addition, there are a number of other institutes dealing with breeding cereals, but there seems to be little interchange of segregated germ plasm for regional testing. There are four university faculties conducting research in animal science, one Ministry institute doing the same thing, and one university and one Academy institute involved in veterinary research, but the links among these various institutes appear rather limited and an examination of their programs suggests that there is scope for greater problem-orientation and less duplication. **There may also be scope for a national network of regional stations working across commodities.** Several institutes currently have stations located in close proximity to other institute stations, but there is little working contact between them.

Because past research has been geared to maximizing yields from large State farms and cooperatives, the research system has not been attuned to economic analysis. The Agricultural Economics Research Institute has limited access to micro-data, even that collected by other parts of the Ministry. Its program is almost entirely of a macro nature as is much of that of several other institutes in Budapest which carry out research in agricultural economics. At the production institute level, economist positions have been amongst the first to be eliminated when budgets were tight. As a result, there is limited information available on optimizing resource utilization.

Although the mission examined the ongoing research programs of over 30 institutes, including the universities, we were unable to identify very much production economics research under way. Nor did much of the copious documentation generously provided to us deal with this subject.

Despite the scale of the research effort and the fact that some duplication exists, there are some gaps in research coverage which are becoming more apparent as the structure of farming changes. These gaps, which are discussed more fully in Chapter 5, are problem-oriented rather than product-oriented and focus on issues of economic efficiency at the farm level. Examples are: the efficient use of inputs; minimizing environmental hazards; producing more responsive crop varieties; obtaining better feed conversion ratios for livestock and increasing feed and forage crop production and utilization. In all cases research will need to include an assessment of both the economic response and the social acceptability of the research funding.

In the past the links between the research institutes, the public enterprises providing services to agriculture, and the State farms and cooperatives made it possible for the rapid and effective transfer to part of the production sector of research findings and results, particularly with respect to improved germ plasm. This has been facilitated by the fact that many State farms and enterprises have been prepared to provide some financing for research. This situation is no longer valid and, coupled with the move towards privatization, suggests that **research institutes will need to reassess their approach towards technology transfer.** It is difficult to make other than a generalized

comment on this topic until the nature of the new government extension service has been defined. Extension activities are, however, likely to be particularly important for research institutes or stations which deal with specific ecological situations. These activities will involve substantial incremental costs.

We would like to draw attention to one final constraint, that is, the low salaries paid to scientists in Hungary. In absolute terms, salaries in Western Europe are a multiple of (4 to 10 times) those in Hungary, and in purchasing power terms they are 1.5 to 3 times as high. Given the excellent quality of scientific education in Hungary, it is inevitable that some scientists will move abroad. To some degree this can be stopped by providing good equipment and facilities locally. New projects such as those financed by the World Bank have helped to do this. But the salary factor is of paramount importance. If Hungary wishes to retain a research and development system that will enable its agriculture to be productive and efficient enough to be competitive within the EEC, it will be necessary to develop a salary and incentive structure for agricultural scientists that is much more attractive than at present.

The system is, therefore, ripe for reform. Although reform should not be too precipitate, it is unlikely to be successful without some fairly drastic changes to avoid research programs and institutes withering away for lack of funds. To avoid damage to staff morale that inevitably occurs from a long drawn-out period of organizational uncertainty, reform should be brisk but judicious.

CHAPTER 3

THE FUTURE SHAPE AND CHALLENGES FOR AGRICULTURE

3.1 INTRODUCTION

In June 1991 the Hungarian Government approved a new policy and program for the agricultural sector. This called for a major transformation of the whole Hungarian food sector in order to respond to the challenges presented by changes in external markets, internal price policies, and land tenure. The prime objective of the new policy is to establish an agricultural production that is more efficient, adaptive, and market-oriented than the present one. Considerable stress is placed on market objectives since 30% of Hungarian agricultural production is exported, although in the past the export market has often been both distorted and limited by State intervention. Agricultural exports are seen as essential for a strong economy and the new policy stresses the need to maintain a strong export market in Eastern Europe while targeting the EEC as the prime market for future growth in agricultural exports.

3.2 THE FUTURE SHAPE OF AGRICULTURE

It is the Government's view that "the (future) direction of international development in production and trade is towards the larger scale farms, towards concentration. A domestic development in the opposite direction may fundamentally reduce our comparative advantages." (*Hungarian Government Agricultural Policy and Program, June 1991*). While the Government expects that 70% to 80% of arable land and 35% to 40% of forests may become private land, it strongly supports the concept of larger production units and strongly opposes unjustified fractionation of land.

This view was confirmed in discussions with many agricultural scientists during our visit. They stressed the dilemma of trying to liberate private entrepreneurial skills without forfeiting the achievements of the past. While the nature of future farm management systems still remains to be determined, they are expected to include[1]:

1) "Large production co-operatives and State farms with diversified activities including R&D, which will be managing enterprises with decentralized, independently functioning units, perhaps medium- to small-scale enterprises.

2) Large enterprises with a limited range of activities producing high-quality goods, and consisting of co-operating small- or medium-scale enterprises.

3) Mass production enterprises concentrating on a successful enterprise and dropping uneconomic activities.

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[1] Lang, Csete and Harnos: The enterprisal system of adjusting agriculture in Hungary.

4) Production co-operatives on unfavorable land are expected to disappear. Any viable private production units within these may form specialized co-operatives, or small-scale enterprises.

5) Independent medium-sized enterprises will be organized primarily for research and development and for providing various services.

6) The scope of small independent ventures will be extended."

All of these projected management systems assume a substantial amount of cooperative activity, as well as a range of operations which will include the supply of information and inputs, management expertise, technical advice, processing and marketing. There will be considerably more decision-makers in the agricultural production systems of the future, but the projected farm structure is still likely to be a long way from the concept of a production system consisting mainly of family-operated farms.

3.3 FUTURE MARKETS

In considering the future market for agricultural products the prospects for increasing domestic food use in Hungary do not appear to be particularly promising. Average daily intakes (1984-1986) of calories (3541), proteins (101.7 g) and fat (141.5 g) are all high by world standards, particularly the use of animal fats (111.1 g). The annual per capita intakes of products with high income elasticity of demand, such as meat (76 kg), milk and dairy products (180 kg excluding butter), eggs (375 pieces), fruit (72 kg) and vegetables (88 kg,) are all high and have changed little in the past 10 years, although potato consumption has dropped by nearly 50% in the past 50 years. The variety of vegetables available appears to offer scope for expansion and the high incidence of heart disease (4th highest in the countries of the Organization for Economic Cooperation and Development [OECD]) may lead, in the long term, to a shift away from the use of animal (pig) fat and toward polyunsaturated vegetable oils. But overall, any increases in agricultural production will likely have to be absorbed by the processing or export markets rather than by domestic consumption, and the latter offers little by way of guidance for future research strategy.

3.4 FUTURE CHALLENGES

Given the limited scope for new domestic markets and the need to make management systems competitive and profitable at a lower input level than in the past, Hungarian agriculture is likely to be faced with challenges in terms of maintaining rural employment, changing the patterns of land use, particularly on marginal lands, and improving product quality. The emerging small private farm sector will need new technologies. Finally, environmental considerations, demanded by regulatory agencies, are expected to become more persuasive throughout the agricultural production and food processing systems. The remainder of this chapter considers some of these challenges and the opportunities they present.

3.4.1 Closer integration with the EEC

Although the EEC already has several trade and cooperation agreements with Hungary, the new accords of November 22, 199 extend these much further and are expected to open all markets between the two parties by the end of the 1990s. To capitalize on this, Hungary will have to carefully assess where its comparative advantages are and reshape production accordingly. This could be facilitated in the area of research by using models and climate-specific crop performance characteristics to define the optimal systems of rotation and farm technology combinations. Membership of the EEC will, however, bring Hungary face to face with new problems (as discussed later in this chapter) with respect to standards, quality considerations and competition.

3.4.2 Quality production

A key element in successful marketing is the ability to continually place high-quality products in the market. This is not always done in Hungary. For example, although the quality elements of wheat are well understood, the selection and breeding for specific markets, other than the USSR, is not observed.

There are a number of other crops where attention to quality is required, for example in barley for brewing special beers, and in the composition of edible oils, especially with regard to the influence of climate and storage conditions on fatty acid composition. A recognition of the interrelations of quality at all stages of the production and processing cycles will be necessary to improve quality in both existing and potentially new plant and animal products.

There may also be considerable opportunities for expanding the market for vegetables once the quality criteria of consumers are well understood. The ability to meet the special quality criteria for a range of vegetable crops and for fruits, flowers, and ornamentals will present opportunities for high incomes from small land areas. Exploratory market research on volatile oils and spices might also be a role for the private sector in Hungary. Opportunities of the type presented above offer challenges for future agricultural research.

3.4.3 The use of marginal land

Because of the high productivity of agricultural technology throughout Western Europe, much of the marginal land in Hungary may not be competitively viable to cultivate, and may need to be left under natural conditions, afforested or used for less intensive agriculture such as forage production. Natural parks and wildlife management also offer new opportunities for using such lands within the growing European leisure market. Apart from their touristic role, parklands would help to conserve genetic resources for endangered flora and fauna.

The extent to which marginal lands may have to be taken out of production in a market economy is illustrated by Table 3.1, which compares the profitability of production between different counties for a selection of the most and least profitable commodities in 1984.

Table 3.1

Profitability (loss) as a Percentage of Total Production Costs (1984) for the Least and Most Profitable Counties in Hungary

Product	Least Profitable	Most Profitable	Difference
Wheat	40	58	18
Corn	(20)	40	60
Sugar beet	(11)	42	53
Green paprika	(33)	42	75
Cattle for slaughter	(2)	27	29
Pigs for slaughter	6	27	21

Source: Ivan Benet: Hungarian Agriculture Policy in an International Prospective.

3.4.4 Rural employment

The less intensive use of marginal lands and the likelihood of lower input as a result of both economic and environmental factors will probably contribute to a lower level of employment in agriculture in the future. Thus, the past trend of a steadily decreasing percentage of the population employed in agriculture will no doubt continue unless very labor-intensive activities, such as floriculture, grow very rapidly. However, there appears to be little that the agricultural research sector can do to counteract these trends.

3.4.5 Environmental considerations

Environmental pollution is a widespread problem in the countries of Eastern and Central Europe. Almost all of Hungary's groundwater supplies are polluted as a result of the intensive use of fertilizers and pesticides by the agricultural industry, as well as poor standards of water treatment.

Apart from the very high use of fertilizers, in 1986 Hungary was consuming 9.6 kg/ha of pesticides, a level that compared unfavorably with France (7.0 kg/ha), the Federal Republic of Germany (4.2 kg/ha), and Denmark (2.7 kg/ha), and was almost as high as that in the Netherlands (10 kg/ha). The latter country has had to conform to EEC legislation which called for a dramatic overhaul of technologies. This has led to the withdrawal from the market of 40 varieties of pesticides that were found to have persistent residues toxic to living organisms in water, and 18 varieties which left soil residues that were not readily biodegradable. By 1996, the Netherlands is expected to have withdrawn 67 types of pesticides from the market.

It is not only such factors which emphasize the need for Hungary to rapidly implement its new environmental policies. There is also the risk that privatization will increase pollution levels still further. This highlights the need for more research to develop an environmentally friendly but cost-effective agriculture.

3.4.6 Animal welfare

Although it may not be an immediate problem, Hungarian researchers are likely to have to provide the research answers, in the medium term, that will permit the development of animal housing systems that conform to the welfare requirements of the EEC. Current levels of animal housing on large farms do not always meet the space standards now required in Western Europe.

3.5 OPPORTUNITIES FOR EEC LINKAGES

While closer links with and ultimate membership to the EEC will place new challenges before agricultural research in areas such as product quality and environmental and animal welfare, they will also offer new opportunities and challenges for inter-country research collaboration. This type of collaboration already exists with some European countries but is likely to increase as closer EEC links develop.

Within the Community a major effort is being made to strengthen research linkages. This is being done in two ways: through horizontal linkages relating to sector- or commodity-oriented research, and through vertical linkages associated with more basic, discipline-oriented research.

In both cases the EEC supports pre-competitive (not immediately marketable) research. As a consequence, there is a stronger focus on vertical linkages since the private sector offers comparative research advantage for horizontal type activities. However, even here the opportunities might be exploited by Hungarian private researchers in EEC programs such as EUREKA.

In the public sector the vertical entrance offers clear opportunities, given the state of technology in Hungary, to pool scientific knowledge in the pre-competitive area in a unified Europe across a broad span of research institutes. The community is now supporting high-level disciplinary networks through computer bulletin boards. This could be of particular relevance to certain Hungarian research institutes, such as those in biotechnology and plant protection. It is envisaged that these computer networks, representing the most up-to-date expertise in the community, will provide the technical know-how for future policy-making in their fields.

Support for inter-institutional research activities within the community requires that at least two countries participate in the activity. Funds are provided by the Directorates General of Agriculture (VI), Science and Technology (XII), and Fisheries (XIV) for research in the following four areas, identified by member countries as priorities:

1) primary production,
2) inputs,
3) usage of biological raw material,
4) end use and final product quality.

While these opportunities will not be available to Hungary in the immediate future, it is only a matter of time before Hungarian scientists can make use of them. This should not be overlooked in planning research for the medium term.

3.6 PRIVATE SECTOR RESEARCH

Complementarity between public and private sector research can make a significant contribution to the rate of technical change in agriculture. Private sector research is currently at a low level in Hungary although, in the case of maize, farmers are already benefitting from the new role of the private sector. In the future, public research and regulatory policies will need to be directed at stimulating private involvement in R&D and in seed production by keeping research, production, and marketing regulations to a minimum, and thus assuring quality and competition. The Government has already made an active and positive start in this direction by enabling private sector research to access OTKA and OMFB funding, and through passing new legislation with respect to the creation of foundations.

CHAPTER 4

THE CHANGING POLICY BACKGROUND

4.1 THE NEW AGRICULTURAL SECTOR POLICY

In the last chapter reference was made to the Hungarian Government Agricultural Policy and Program (June 1991). A number of features of this new policy and program have important implications for future agricultural research strategy. These include:

- the emphasis on a regional approach to agricultural development;
- the recognition of the need to preserve a sustainable environment;
- the need to develop an adaptation strategy that results in an agricultural sector readily able to harmonize with that of the EEC, if and when Hungary becomes a member;
- the understanding that the attainment of a level of efficiency equivalent to that of Western Europe is likely to reduce the number of people employed in or sustained by certain types of agricultural activity; and
- the very close links between agricultural production and food processing, and the need to overcome poor management and technological obsolescence which characterizes much of the food processing industry.

The role of the State is seen as indispensable in terms of developing policies, and managing and financing research and development even within a market economy. The State has a contribution to make in ensuring that production objectives are integrated with the conservation of renewable resources, paramount amongst which is the land used for agricultural production.

The agricultural research and development strategy seen by the government as being required to meet this goal calls for more emphasis on:

- biotechnology research for both raw material production and product processing,
- a broader development of technology with a greater involvement of the private sector (including foreign resources),
- production of new export products,
- use of environmentally friendly chemicals and techniques,
- improving post-harvest management particularly in storage, packaging, and transportation.

The State is seen as having prime responsibility for financing most basic research, while the private sector is viewed as having an increasing role to play in applied and adaptive research. This represents a great change from the past when a major part of financial support for agricultural research came from a captive market through the seed industry, cooperatives, and State farms.

4.2 THE GUIDELINES POSTULATED FOR A RESEARCH STRATEGY

The development of a competitive modern agricultural sector will require strong support in research and development activities. Historically, such support has been available and its success can be judged by the prominent role that agriculture continues to play in the economy by virtue of its contribution to the gross domestic product (GDP), to employment, and to exports. But the changes involved in adjusting from a centrally planned to a market economy have resulted in a major crisis in the funding of agricultural research during 1991, with further reductions possible in 1992.

The Ministry of Agriculture has responded to this situation by preparing a paper which stresses the specific and unique responsibilities of the public sector for agricultural and natural resources research. It proposes that these responsibilities be met in the future by a multi-channel funding system in which public sector institutes are financed by a mixture of central funding, producer contracts, and production cesses. A Research and Development (R&D) Structure Changing Committee, established by the Ministry in May 1991 proposed that existing public sector agricultural research institutes be divided into 4 groups. The original proposals, which were subsequently modified were that:

1. Six of the eight existing Ministry research institutes would be retained by the Ministry. They would be smaller units than they are at present, but with a better paid staff. Their work would include mainly research, with some extension work, but no commercial activities.

2. Two of the eight existing Ministry research institutes (Cereals and Irrigation) would become public companies conducting research and development with some research funding from Ministry contracts.

3. Two research institutes (those dealing with Fruits and Vegetables) currently funded in part by the Ministry and in part by State enterprises would be converted to foundations. The Government would provide them with an endowment through privatization of its extensive land assets, the sales from which provide much of their current enterprise revenue. (A subsequent document has suggested that the Vegetable Research Institute should be a joint venture.)

4. The precise role of the six agricultural universities and the five major research institutes belonging to them (plus the Horticulture University Station at Eger and the Vetomag Seed Company Research Institute at Nyiregyhaza - both of which would like to become legal entities attached to agricultural universities) has been left for the Universities to review. (Until November 1990 the university system received its core budget but no research contracts per se from Ministry funds.) The Ministry paper proposes that the university system and private research bodies should be included amongst organizations and institutions allowed to compete in the future for contracts financed by the Ministry.

The role of food processing research in the network of agricultural research in Hungary is a special one. At one time there were about 14 research institutes in the Ministry of Agriculture that dealt with food processing. All but one of these have become State enterprises funded by the specific industries that they serve (alcohol, milling, canning, baking, etc.). This funding is derived from both commercial and advisory activities. Two of the institutes (tobacco and sugar beet) do some crop production research but their activities generally relate to the post-harvest stage. The anomaly here is that the Food Research Institute receives its core budget from the Ministry of Agriculture. This is rationalized on the grounds that it is the only research institute in Hungary conducting basic research on the food industry (although some is also done at the Horticulture and Food Industry University). Such research is regarded as an essential component in the proposed new national research strategy.

Only brief reference is made in the Ministry paper to the four agricultural research institutes financed and managed by the Hungarian Academy of Sciences. Although it is recognized that these Institutes should be an important element in any national research network, no mechanism for bringing this about is suggested.

An important section of the Ministry paper deals with streamlining the management of agricultural research to make it more feasible and efficient. It proposes the establishment of an R&D Committee for Agriculture to advise the Ministry on:

a) long-term R&D plans and priorities,
b) financing and implementing priority programs,
c) implementation mechanisms.

The Committee has authority to:

a) formulate funding allocations between subsectors and programs,
b) modify or terminate projects,
c) establish and control monitoring and evaluation systems.

At the subsector level the Committee is assisted by 11 task forces (collegia) which were appointed following nomination by interested parties in October 1990. The role of these task forces is to allocate resources (up to a level defined by the R&D Committee) in their mandated area (see chapter 2). Each collegia has two co-chairpersons. One is an elected Ministry official who reports to the R&D Program Office. Task force membership is predominantly scientific from research institutes, academy institutes, and universities but it also includes some persons from user circles. The task force system is designed to delegate operational decisions and responsibilities and to allow Ministry staff time for policy-making and higher-level management of the research system, particularly from the standpoint of development.

These developments in the Ministry of Agriculture have taken place against the background of an active and dynamic national discussion aimed at reforming and reorganising the institutions responsible for science and technology policy inherited from the former regime. One of the central issues is the type of ministerial structures that need to be introduced. Several proposals are currently under review: creation of a Ministry for Research and Technology combining the functions of the Academy of Sciences and the National Committee for Technological Development; creation of a Ministry for Higher Education and Science together with a Ministry for Industry and Technology; or reforming the Academy. The mission was advised that key decisions in this area were expected during the next year. These could clearly have important implications for agricultural research.

Against the background of these proposed national policies and ministerial guidelines, as well as its own observations and findings, the mission sets out, in the following chapter, some alternative scenarios for Government consideration with respect to the organization, management, and financing of agricultural research in Hungary.

CHAPTER 5

THE FUTURE ROLE AND STRUCTURE OF THE AGRICULTURAL RESEARCH SYSTEM

5.1 INTRODUCTION

In Hungary, agricultural and food industry research funded by the public sector faces three broad challenges:

1) to make agricultural production and processing systems more competitive in both internal and international markets;

2) to respond to pressures for an agricultural industry that serves the social and economic objectives of society as a whole (including its demands relating to environmental management);

3) to encourage the growth of efficient private sector research and development (R&D) that serves the broad goals of agricultural development.

5.2 THE FUTURE NEEDS OF RESEARCH

The discussions that the team held during its visits to the Ministry and to research institutes suggested that the research system of the 1990's would need to be able to provide new information and new technology for an agricultural and food industry that was changing to:

1) be profit-oriented, requiring the more efficient use of inputs, for example, fertilizers and irrigation water;

2) be market-oriented, targeting on improved product quality especially for fruits, vegetables, and meats for both national and international markets;

3) embrace a wide range of farming systems, of different sizes, and with varying management skills;

4) serve the wider needs of society by improving agriculture in areas such as those with poor soils, where farming incomes are likely to be low;

5) conserve natural resources and generally improve the environment by using forest lands in new ways, for example, as game reserves and for tourism; and

6) be equipped to cope with EEC regulations.

A research strategy to support the development of such a system will require reduced research efforts in some areas and increases in others. An appropriate strategy will need to rationalize the changes, through setting priorities , allocating resources and monitoring and evaluation of the use of the human and financial resources and the progress and value of the research.

5.3 THE ROLE OF PUBLIC SECTOR FUNDED RESEARCH

As noted in chapter 2, past agricultural research has been financed through a combination of funds generated directly by agricultural production, processing, and marketing operations, as well as by funds received directly from the public sector via the Ministry of Agriculture. Since the production and public sectors were closely interlinked, the source of funding, whether direct from industry or indirect via the Ministry, was not of critical importance.

There are now major changes in the agricultural industry funding of research. These changes include:

1) The loss of substantial markets in Eastern Europe for such products as fruit, wine, and lower quality meats. Loss of income by suppliers to these markets has already led to serious cash flow problems, decreases in planted area, and, hence, lower purchases of seeds and planting materials, and fewer contracts for technical advice and support. The income of some research institutes from domestic agricultural producers has fallen, and institutes have begun to focus their efforts, for example, on providing seed for export.

2) An increasing number of joint ventures in agricultural production and processing. This may result in imported technology from foreign partners. Whether these joint ventures will continue to support local research or depend increasingly on imported technology will depend to a considerable degree on the availability of the necessary pre-competitive and/or backstopping research in Hungary.

3) Changes in the future shape of the whole agricultural industry, including farm size and ownership, and production and marketing systems. The nature of these changes is still unclear, making it very difficult to define a research strategy for the future. It is certain, however, the strategy will have to be flexible to meet emerging agricultural needs. Some production systems will be able to provide financing for research and development, but others, for example small farms and resource-poor areas, will need public sector funded research.

In examining the role of public sector support for agricultural research, it is important to distinguish between the roles of different kinds of research. Hungary has a long tradition of substantial investment in R&D and many of the country's scientists have achieved world renown. Thus, there is a justifiable pride in good scientific research and strong support for its various aspects, especially basic research. However, because

of the different sources of funding for different kinds of research, especially that from OTKA and OMFB, general agreement is needed on definitions for the different kinds of research. While research is obviously a continuum with no clear boundaries between basic, strategic, applied, adaptive, and development research, there are conceptual boundaries which allow working definitions.

Basic research is generally understood to mean speculative research designed to generate new knowledge without any particular use in mind. Much of the work in agricultural research in Hungary, although referred to as basic, does not really fall under this definition. Strategic research is widely accepted as a description for work (which may be speculative) designed to produce new knowledge or new techniques to solve specific research problems. It will thus have well-defined objectives. Applied research is the use of existing knowledge and techniques to create new technologies.

At the opposite end of the research continuum is what is generally referred to as adaptive or development research, whose goal is to adjust technology to specific local conditions. As private sector R&D increases in strength, it should be expected to play an increasingly important role in adaptive or development research, and to be supported by publicly funded strategic and applied research.

In stable financial circumstances the public sector would be expected to finance most of the strategic research and a substantial part of the applied research. In the area of natural resources this would include work on land use changes, soil conservation, drainage and salinity problems, forestry, and conservation of other natural resources for social needs. In animal and plant sciences research in the field of biotechnology, new methods of pest and disease control, new crops for domestic use and export, and energy conservation techniques in crop production and livestock housing are likely to require public sector financing. Another important area for the public sector is research on the social and economic consequences of new technology. This includes studies on the impact of different land ownership and use patterns on production and income distribution, and the management needs of such farm systems. Public sector support will also be needed for the design and development of new kinds of linkages between the research system and the new and revised production systems.

The agricultural sector itself should be expected to finance some of the applied research on plant and animal health/protection and breeding, where it can capture the benefits of such research. It should also be expected to finance the development or "near-market" research on animal and crop production systems to meet emerging market possibilities and some research on processing and quality control.

5.4. DEFINING PRIORITIES FOR PUBLIC SECTOR RESEARCH

In the past, research institutes operated in a pseudo-market economy. The criteria used to decide whether a project would receive support were often unclear and strongly influenced by State ideology. The research establishment was organized in a fragmented way that led to competition and overlap. While this may have ensured that interesting topics received attention, it did not guarantee that the most relevant ones always received the inputs they required.

The task forces (collegia) set up as part of the Ministry's R&D Committee represent a step forward although they are not really structured to develop long-term multidisciplinary programs. OTKA and OMFB likewise award grants for "projects," though usually small ones. Thus, in the absence of long-term core funding it is perhaps inevitable that the immediate concern of many institutes is short-term survival. Until they have stable funding, it is difficult for them to envisage a meaningful strategy and to set future priorities.

It is difficult to develop research priorities to deal with the future needs of agriculture in the existing atmosphere caused by current traumatic changes in the agriculture production systems. It is obvious, however, that future agricultural production systems, whatever their form, will need to produce for export markets. In the short term, these will be the protected markets of the EEC and the impoverished markets of Eastern Europe. In the long term, they will be Hungary's EEC partners and a more prosperous and stable Eastern Europe.

There is little to gain by deferring decisions on research priorities until the future direction of the agricultural industry is clear. Indeed, the present challenges provide an opportunity for developing a research strategy to rationalize the present research system. While it must be emphasized that a strategy for rationalization is no substitute for adequate funding, an appropriate rationalization can contribute to a long-term strategy rather than be a reaction to a, hopefully, short-term crisis. A well-thought-out strategy will ensure that Hungarian agricultural research retains its most useful facets and discards areas of low priority and superfluous capacity.

In the future, agricultural and food industry research is likely to need to set some new priorities and adopt some new roles while maintaining an important part of its existing program. Based on documentation and discussions with the Ministry and the various institutes visited, the following is a tentative list of theme areas within which research priorities will need to be set. Each theme area would contain a number of multidisciplinary research programs to be undertaken by the appropriate research institutes.

THEME I: CROP IMPROVEMENT AND PROTECTION

Major Programs:

a) Cereal
b) Oilseed
c) Forage and Grassland
d) Vegetables
e) Orchards including Vines

THEME 2: LIVESTOCK IMPROVEMENT INCLUDING ANIMAL HEALTH

Major Programs:

a) Pigs
b) Dairy and Beef Cattle
c) Sheep
d) Poultry and other Small Stock
e) Fisheries

THEME 3: PRODUCTION SYSTEMS

Major Programs:

a) Integration of Livestock and Crops
b) Improving Efficiency of Inputs, Feed, Pertilizer, Energy, Labour, Water
c) Economics of Different Production Systems
d) Crop Modelling

THEME 4: POST-HARVEST PROCESSING

Major Programs:

a) Market Assessments
b) Storage and Processing
c) New Product Development

THEME 5: NATURAL RESOURCES CONSERVATION AND MANAGEMENT

Major Programs:

a) Soils (Erosion, Waterlogging, Salinity)
b) Pollution (Atmospheric, Water and Land Pollution)
c) Commercial Forestry
d) Recreational Lands and Waters, Conservation Forestry

THEME 6: AGRICULTURAL POLICY STUDIES

Major Programs:

a) Regional Studies for Land Use Assessments
b) Costs of Production
c) Impact of External Market Policies on Agricultural Production
d) Economic Policy

This list of programs is not meant to be exhaustive, merely indicative. Within each program we would expect to find a range of research projects of a strategic, applied, and adaptive nature.

This is seen as part of the strategic planning and priority setting task which is discussed in the following section of this chapter.

5.5 RESTRUCTURING AGRICULTURAL RESEARCH

Structural changes in the Hungarian research system will not, by themselves, increase total resources, but they can help to lead to the more efficient use of existing physical, financial, and human resources. Changes need to be designed to allow flexibility in both management and allocation of financial resources, so that the research system can react to national and international changes affecting agriculture. The research system must therefore allocate one part of its resources to maintaining a good long-term research program, and another part to the exploitation of new opportunities in the scientific or commercial world.

As indicated in Chapter 2, the agricultural research system in Hungary has a generally high standard of laboratories, libraries, experiment stations, and staff. Some modernization of equipment will be necessary in some areas, but the system definitely does not require a massive rehabilitation. Similarly, the scientific staff are very well trained, highly motivated, and thoroughly familiar with most up-to-date research techniques. in some cases being world leaders in their field.

The objective of restructuring the research system is therefore to focus these resources on the important problem areas of the future and to ensure that there are adequate operating funds.

In suggesting models for a new structure for the agricultural research system in Hungary, it is recognized that there are many available models used elsewhere in the world. Some systems are highly centralized, others largely decentralized; some are closely integrated with university systems, others largely independent. Some separate the various kinds of research, such as basic and applied, into different institutes, while others make no such distinction. Some may be closely integrated into advisory systems, others may relate to them in a distinct though collaborative manner. However, all productive research systems are characterized by stable funding, adequate operating funds, critical review procedures, rewards for excellence, and efforts to coordinate work and orient it towards high priority areas.

A restructured agricultural research system for Hungary will have to take these factors into account. It will also have to manage the transition from the present 50-year-old system to a new system with a different social, economic, and technical orientation.

Within the Hungarian system various options could be considered. The first possibility would be for the Ministry of Agriculture to be the principal manager of the national agricultural research system. This could be done in several ways:

1) The Ministry could manage all agricultural research; it would decide on priorities, allocate funds, and monitor research results. Research programs would be executed by the existing research institutes of the universities, Ministry, and the Academy of Sciences. Rationalization of existing institutes could take place by amalgamation or closure, and by changing their research orientation.

2) The universities could be made responsible for conducting all research, with the Ministry and Academy institutes being incorporated into appropriate universities. The Ministry might still be responsible for deciding priorities, allocating funds, and monitoring results.

3) The Academy could have the prime responsibility for managing research institutes but with the Ministry deciding priorities, controlling all applied and adaptive research funds, and monitoring the results against development goals. The universities would be mainly teaching institutions, with a minimum of research activity.

Any of these options would require the Ministry to have a much larger scientific staff to fulfill its new management role. Clearly, this would be possible with appropriate financial resources. A more difficult problem is that the Ministry is heavily burdened with its responsibilities in commercial agriculture. It also faces many short-term problems with political and economic dimensions.

We suggest that the Ministry is not the most appropriate organization for managing the national agricultural research system and controlling its long-term orientation. We emphasize, however, that the Ministry should have a major influence on the kinds of research that are pursued, for example, by being able to commission the use of research funds.

A second possibility would be for the Academy of Sciences, rather than the Ministry, to be responsible for the management, allocation of resources, and monitoring of agricultural research. This would be accomplished by giving the Academy a block of funds either directly from the Ministry of Finance or via the Ministry of Agriculture. The Academy would then manage these funds and research would be executed by one of the three routes noted above. As in the case of the Ministry, this would require that the Academy have a larger scientific secretariat to manage the system.

The advantage of this option is that the Academy would not be concerned with the day-to-day commercial problems of the Ministry, but would be able to take a long-term strategic view and take a more neutral stance in other areas of concern, such as environmental issues. On the other hand, the Academy is concerned with many other areas of science and giving it prime responsibility for agriculture might be to the detriment of the other activities. The Academy is also oriented to basic science and might be seen as not being sensitive enough to the needs of applied and development research in a major production sector. It also already manages its own four agricultural institutes and could face conflict of interest problems. Furthermore,

it is not equipped to establish extension linkages which must be a key element in the agricultural research system of the future.

A third possibility for management of the research system would be the creation of some new Apex Body, perhaps along the lines of an Agricultural and Food Industry Research Council. Such a body could receive a block of funds from the Ministry of Finance for core funding, with an additional allocation from the Ministry of Agriculture, earmarked for commissioned research on particular topics. Such a Council would be responsible for determining priorities, using committees such as the existing Ministry "collegia" for allocating funds and monitoring research results. It would provide advice to the Ministry on the application of research and be responsible for providing the Ministry and its extension arm with the technology for agricultural development. The existing research institutes, rationalized or amalgamated to follow a long-term strategy, would be responsible for the execution of the research program.

This route also has advantages and disadvantages. It creates yet another organization involved in agricultural research. It could be seen as removing responsibilities and power from both the Ministry and the Academy, and as another organization competing for limited funds. It would require the establishment of mechanisms for linking the research system with the producers. An Apex Body or Council would, however, have the advantage of being a new body which incorporates as members all current elements in the research system, and would be able to take a fresh and critical look at the agricultural research system. It could introduce new management techniques without being constrained by existing regulations, and make difficult decisions on rationalization of the present system. These advantages appear to outweigh these advantages and it is, therefore, the option of choice of the mission.

5.6 THE FUNCTIONS AND CONSTITUTION OF AN AGRICULTURAL AND FOOD INDUSTRY RESEARCH COUNCIL

The major functions of such a body, in its initial stages, would be the development of a national strategy for agricultural and food industry research in Hungary, designed to organize and manage research into the 21st century. Its major tasks would include the development of a set of priorities to match the needs of the rapidly changing agricultural and food industry, and the design of a financial plan. Among its most important jobs would be the development of a system for linking research to technology transfer. In the past, research had very effective links to the production system through the model farms and the State cooperative farms. But these are no longer sufficient.

In view of its major role in managing the country's restructured research system, the Council's chief executive (possibly holding the rank of Under Secretary of State) would be appointed by the Government, and would need a strong scientific and managerial background. His staff, which should be small but highly qualified, would possess scientific expertise in the major areas of the natural resources covered by the Council's research mandate. These would include animal husbandry, crop science, forestry, as well as financial management and economics.

The Council should be chaired by a prominent member of the business, political, or scientific community, and should have representation from a range of involved institutions -- the Ministry of Agriculture, Ministry of Finance, Academy of Sciences, Agricultural universities, agro-industries, smaller producers, and consumers. The Council should report to the Minister of Agriculture, and through him to an Agricultural Committee of Parliament, should such a committee be established.

5.7 LINKAGES WITH REGIONAL PRODUCTION SYSTEMS

The agricultural research system will need to provide strong inputs into the agriculture of the different ecological regions. At various stages in the past, regional networks of stations existed (particularly for forestry and viticulture), each of which had six or seven separate stations. For crops the various Ministry institutes, Academy institutes, and universities have all had some regional stations.

The various institutes and stations distributed throughout the country offer more than adequate coverage of the various soil, climate, and agricultural production systems. Historically, however, the research emphasis has been to maximize productivity on one crop, rather than develop economic production systems that take into account the ecological advantages and disadvantages of a particular region and work on a series of crops. Shifting the emphasis to the latter will be an important task of the future, as agriculture faces the full force of competition from both within and outside the country.

It is suggested that a selected number of research institutes and stations, probably about 12 (including university locations) should be given specific regional mandates under which they would develop production systems for particular ecological conditions, in conjunction with the more specialized research institutes. Such regional institutes would serve as testing grounds for technologies, would modify and adapt such technologies, and would work closely with advisors to the different kinds of farm production systems. Specialist (extension) advisers might work at these institutes.

There are a number of stations and lands which are probably surplus to medium-term research requirements. Specific needs will be more readily identified as agricultural systems evolve and surplus stations may then be disposed of or developed as experimental husbandry farms. These could be run as economic production units to demonstrate the use and management of new technology. Thus, they would perform several of the functions of the model farms of the past, but also have a strong economic orientation.

5.8 FUNDING REQUIREMENTS

In Chapter 2 of this report we estimated that in 1990 the level of agricultural research funding in Hungary was of the order of 2.2 milliard forints with a further 0.3 milliard for the food industry.

The decline in both direct and indirect Government support, the limited private sector support, and the high rate of inflation in 1991 have resulted in the current

financial crisis in agricultural research funding. Income projections for 1992 suggest that this situation will be exacerbated. A number of scientists have already left the research system to emigrate, a number of research stations have been closed, and research programs curtailed.

Many of the research directors interviewed by the mission felt that the system as a whole had become too large and fragmented. Not only did unnecessary duplication exist but there were a number of unproductive researchers in the system. It was repeatedly suggested to us that Hungary required a smaller but better integrated national agricultural research system budgeted at about the 1990 level (in real terms), but with fewer and better paid scientists, better facilities at some institutes, and reliable and sustainable funding.

In the following pages, we examine this premise in terms of 1990 forints to avoid comparisons with the reduced 1991 research budget, and to eliminate calculations relating to inflation.

Our analysis is based on the assumption that there are certain responsibilities with respect to agricultural research that are likely to remain in the domain of the public sector, and others which should be the responsibility of the private sector. We recognize, however, that the private sector in agriculture is still in the process of formation and that, due to the shortage of capital and the prevailing high interest rates, it is likely to develop only slowly during the next few years.

In order to assess the level of support in forints, the mission has looked at the situation of Hungarian agricultural research in 1990 and has compared it with other European countries, using data available for the period 1981 through 1985 (Table 5.1).

While care must obviously be exercised in cross county comparisons, particularly for different years, it is interesting to note that in financial terms, while a research budget of 2.4 milliard forints[1] is on the low side, it is not too much out of line with some of the other European countries in the table in relation to agricultural GDP and employment in agriculture. Where the contrast is sharp between Hungary and the other countries is in the relatively large number of researchers in Hungary (i.e. the system may be relatively overstaffed), and in the much lower cost per researcher (largely because salaries are much lower than when compared in terms of purchasing power parity). Given the freedom of movement that is now possible and the high calibre of Hungarian science this obviously introduces a significant brain-drain risk.

[1]This figure excludes one hundred million forints of enterprise funding for food industry research.

TABLE 5.1

SOME COMPARATIVE EUROPEAN DATA
ON AGRICULTURAL RESEARCH
(Hungary 1990, other countries 1981-1985)

	HUNGARY	SPAIN	ITALY	AUSTRIA	GERMANY
Agriculture as % GDP	16.8	6.2	5.0	3.8	2.0
AGRICULTURAL RESEARCH EXPENDITURE:					
as % Agricultural GDP	0.76	0.60	0.75	0.76	2.07
per hectare of agricultural land (US$)	3.8	2.9	10.4	5.1	20.9
per economically active person in agriculture (US$)	46	44	79	67	175
NUMBER OF AGRICULTRAL RESEARCHERS:					
per billion US$ agricultural GDP	332	84	97	119	174
per million hectares of agricultural land	148	40	134	79	176
per million economically active persons in agriculture	2,013	627	1,016	1,048	1,464
TOTAL RESEARCH COST PER RESEARCHER EXPRESSED IN US DOLLARS IN TERMS OF PURCHASING POWER PARITY[2]	39,600	70,800	77,900	64,300	119,300

Source. Central Statistical Office of Hungary and mission data.

In the following analysis we have assumed that an Agricultural and Food Industry Research Council would be established and act as the conduit for all funds for agricultural research. These funds would be used by Ministry and Academy research institutes, the universities, and the proposed new regional institutes. The latter might also serve as location links with the extension services.

[2] This represents a synthetic exchange rate that attempts to reflect the purchasing power of each currency in constant 1980 U.S. dollars.

All commentary and data in the next 4 pages should be taken as being indicative for discussion purposes, rather than as specific recommendations of the mission. A few ideas have been presented in detail in order to indicate the type of discussion required to reach the consensus called for in Chapter 6.

5.8.1 Core institutes

The mission considers that the six institutes listed in Table 5.2 form the minimum core institutes needed under the Agricultural and Food Research Council. For each institute we have indicated, using the directors' own estimates whenever available, the approximate order of magnitude (in 1990 forints) required for the institute to operate at its 1990 level (1991 in the case of the new Biotechnology Institute). In some cases this includes a staff reduction of about 15% to 20% compared to the 1990 level, and higher salaries for researchers.

It is assumed that funds are used exclusively for research, and any commercial profits revert to the Ministry of Finance.

TABLE 5.2
CORE INSTITUTES OF THE PROPOSED AGRICULTURAL RESEARCH COUNCIL

CORE INSTITUTES	NATIONAL BUDGET (m Forints)
1. Agricultural Economics (Ministry) (with a strong micro-focus)	60
2. Soils and Agrochemistry (Academy)	80
3. Plant Protection (Academy)	80
4. Plant Breeding (Academy)	150
5. Biotechnology (Ministry)	150
6. Food Science (Ministry)	180

	640

Although we did not have time to examine the concept, it was suggested to us that certain elements of AGROINFORM relating directly to the recording of research (but not the library, documentation and publishing activities) and the agricultural statistics agency (STAGEC) might be consolidated with the Agricultural Economics Institute into one body.[3] If this were rationalized, the budget suggested above would be insufficient.

A national center of excellence is also required for forestry, fisheries, and livestock research. For each of these areas there are already both a Ministry research institute and university research programs, which, in the case of livestock and forestry, are very strong programs. In each of these cases, the possibility needs to be considered for placing all of the subject matter work in one complex.

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[3]This step was taken after this report was drafted but the table has not been adjusted.

In the case of forestry, there are already close links between the Ministry research institutes and Sopron Forestry University. It may be feasible to bring the two together at Sopron and have the research institute affiliated with the university.

In the case of fisheries, the current research institute is active commercially and also has a small but excellent research program. It may be feasible to merge this institute either with Debrecen University, which is relatively close, or with Pannon, where the livestock program at Kaposvar has a fish research program which complements that of the Fisheries Research Institute.

With respect to livestock research, it is questionable whether Hungary can justify several large, costly complexes, and a case could be made for combining the Ministry's Animal Breeding and Nutrition Research Institute with the Livestock Faculty of Pannon University at Kaposvar. (We did not visit either the Veterinary University or the Academy's Veterinary Research Institute and cannot make specific suggestions about their place in the future research system but it would seem relevant to suggest that the government consider, as a long term goal, the possibility of associating these two animal health institutes with the two animal production ones.)

If the Ministry institutes for forestry, fisheries, and livestock are retained as separate entities, then their budgetary requirements will be about 260 million (1990) forints a year. If they are combined with the universities, there could be a substantial saving on this sum.

5.8.2 Universities

With the reorganization that is taking place within the universities and the proposed new degree structure, the mission believes that a new opportunity is emerging to illustrate that higher level education and research can co-exist successfully. There is considerable potential for the universities to use both undergraduate and post-graduate students, especially the latter, in research activities. This should be fully exploited in an interdisciplinary context.

At least one university is contemplating the establishment of a new Science Park. Such a step could be an important feature in the emergence of private sector agricultural research. The proposed funding for private sector cooperation should be used to encourage projects such as the Science Park.

The universities represent a pool of intellectual talent and generally have good laboratory and farm facilities. Because their human and physical resources are already in place and used for educational purposes, the costs of research are in a sense marginal and probably lower than the costs in an institute whose task is confined to research.

On the other hand, the number of staff participating in research at the universities is large. On the basis of the information given to us regarding existing research programs, it appears that, at a typical faculty staff spend about one third of their time on research at a cost of about 80 million forints a vear. This number appears

somewhat higher at the Pannon Kaposvár campus and may be lower at the Food Industry, Wood Industry, and Veterinary campuses. The mission's calculations suggest that the total budget for university research may need to be of the order of 700 million forints a year.

5.8.3 Ecoregional institutes

With respect to the proposed twelve ecoregional institutes, we suggest that the budgets for some (perhaps four) be part of the university budgets. For the other (eight) institutes we have tentatively suggested a sum of 75 million forints (1990) each, making a total of 300 million forints. A major part of the work in these institutes (see section 5.7) would be devoted to regional trials on materials supplied by the six core institutes (Table 5.2) and the universities. However, each institute would also be expected to be a center of excellence in research areas specifically related to its agro-ecological situation.

After such a short visit, it would be presumptuous for the mission to suggest the precise sites for these stations but locations for consideration might include Eger (with Kompolt), Kecskemét, Karcag, Szarvas, and Nyiregyháza, as well as university locations at Debrecen, Kaposvar, Keszthely, and Mosonmagyarovar.

5.8.4 Cooperative research

A specific element of the budget might be allocated for cooperative research contracts (or "competition") involving one or more Research Council elements as well as the private sector. A portion of these funds could be specifically destined for the private sector and public enterprises, and a portion for the Council institutes in order to stimulate private sector involvement in research (see section 3.6).

5.8.5 Total budget

The total budget for research shown in Table 5.3 is for illustrative purposes. It should be divided into **core budget and variable budget (competitions).**

All of the funds shown in the table are suggested as grants and not loans. In each case the division between core and variable funds is indicative.

By CORE we mean guaranteed income which will ensure that overheads and a portion of salaries are covered.

By VARIABLE we mean that each institute must obtain these funds through competitive project proposals within a strategy defined by the Agricultural Research Council. If these proposals are accepted, they would be granted in the first instance up to an institute's target budget. If an institute failed to submit proposals up to its target budget limits, the funds could be transferred to another institute.

In general we have suggested that 75% to 80% of funds be core at central and regional institutes, and 50% at universities, where there is existing support for some core costs and a need for more research to be funded on a problem-oriented basis.

TABLE 5.3

INDICATIVE BUDGET FOR AGRICULTURAL RESEARCH
(in millions of 1990 forints)

	CORE	VARIABLE	TOTAL	TOTAL NUMBER OF SCIENTISTS
6 CORE COUNCIL INSTITUTES	485	155	640	320
3 OPTIONAL COUNCIL INSTITUTES	200	60	260	130
6 UNIVERSITIES	360	340	700	350
8 REGIONAL COMPLEXES	480	120	600	300
PRIVATE SECTOR COORDINATION		200	200	
TOTAL	1,525	875	2,400	1,200

Within the suggested budget matrix the Council could decide, if it wished, to give some orientation to the focus of research by proposing specific allocations at either the institute or national level in terms of strategic, adaptive, and applied research. For example, it might wish to stress basic or strategic research at certain central institutes, while emphasizing applied activities at the regional institutes.

5.8.6 State enterprises

Certain institutes have not been mentioned in the discussion above. The Fruit and Ornamental Crops Enterprise and the Vegetable Crops Research Institute ceased to be Ministry institutes and became State enterprises some years ago. The Vegetable Crops Enterprise has a flourishing seeds business and expects to be privatized. This Enterprise's production of vegetable seeds, coupled with the importation of seeds and the vegetable research being done at the Horticulture University, may eliminate the need for additional public sector involvement in this area.

The Fruit and Ornamental Crops Enterprise, whose research is long-term in nature, does not have adequate financing for its research. The Government may need to consider whether to support this Enterprise through the suggested private sector cooperative funding, or to incorporate some of the fruit stations in its ecoregional network and to backstop them with Horticulture University research on fruits.

The Szeged Cereals Institute has a commercial operation that includes a franchise for the most widely sold maize hybrid seeds. The mission understands that this Institute's wish to become privatized is likely to be granted. It does not consider it essential or even necessary to have two public sector cereal breeding institutes in Hungary, and the loss of this institute from the public sector is a feasible option, providing that its transfer to the private sector is buffered at the start by the guarantee of a certain

volume of work or orders from the public sector and that the Martonvasar Institute is integrated more closely into the public sector research program. Given that cereals occupy such a large area of land in Hungary and the importance of cereal breeding, we do, however, consider that a national cereal breeding institute should be an essential component of the national agricultural research system and that Martonvasar is well equipped to fulfill this role.

The Geodesy, Cartography and Remote Sensing Institute is likely to have a very important role to play in the future in Hungary. Its services will be needed to assist in restructuring State and cooperative farms, setting environmental policies and mapping. Currently, most of these activities are funded through the 'service' rather than the 'research' budget of the Ministry of Agriculture and we would expect this situation to continue. Some scope for research to be funded by competition should however, still be possible through the 'private sector coordination' element of the proposed new budget structure.

Finally, we should consider the situation as to what should be done if funding proves insufficient in 1992, prior to establishing a national strategy and operational priorities. Should this situation arise, some difficult decisions will have to be made to ensure that long-term damage is not done to the research system as a whole. In such circumstances the mission suggests that consideration be given to curtailing funding in the following sequence:

1) Institutes that may be able to function without public sector support, namely the Cereals Research Institute at Szeged, the Vegetable Research Institute, and the Agro-Engineering Research Institute.

2) The research budgets of the universities. Cuts here would do only temporary damage as staff and facilities can be carried on the university budget. A case might also be made for amalgamating some universities or faculties, but this requires further study.

3) If there are still major gaps in funding even after these substantial reductions, then in order to avoid the risk of permanent long-term damage to the national research system, it will be necessary to make early structural changes to it, even before the strategy has been defined along the lines discussed in section 5.

5.9 SOURCES OF FINANCE

Some research activities need to be maintained on a permanent basis, irrespective of their overall level of activity. For example, institutes with plant or animal breeding programs can lose germ plasm which, in some cases, represents over 50 years of work, if they suffer a total funding cut of even a short period. Plant breeding institutes in particular also need to produce new varieties of certain crops on a regular basis in order to keep pace with the development of new races or biotypes of pests and diseases. Regular funds for this activity are essential for any plant breeding institute.

Scientists conducting agricultural research need to have offices, laboratories, greenhouses, and livestock facilities, all of which should be regularly maintained and repaired even if they are in limited use. The same is true of equipment which should be replaced as it becomes worn or obsolete. Provision for capital replacement is made through depreciating fixed assets. In Hungary the depreciation schedules used are extremely low. As a result, physical plant and equipment are written off at a very slow rate and are assigned values as much as three times their true value. This sometimes makes it difficult to justify funds for replacements.

These comments are made in order to stress that **all research institutes have a certain fixed element in their costs**, irrespective of how much research they conduct. In Hungary, this fixed element usually represents 45% to 50% of total costs for staff salaries and social benefits, and a further 20% to 25% for overhead. The variable costs for the actual research activities (other than staff time) represent 25% to 30% of total costs. For this reason **the mission has recommended** earlier (Section 5.8) that, **depending on the type of institute, 50% to 80% of its total costs be guaranteed by the Agricultural Research Council as a core budget.**

This represents a dramatic change from the present system where competition is predominant and there is inadequate provision for fixed or core budgets.

In an effort to maintain the research system in the face of its own budgetary constraints, the Ministry of Agriculture has made a number of proposals for restructuring the financing of research (Section 4.2) particularly for institutes that either have been or may need to be divested from the core budget.

One proposal is to create foundations, to be funded by the sale of State assets. This is an idea with merit but it is untested in Hungary and may take some time to realize, given the shortage of capital for purchasing land and the high interest rates for loans. In the case of the Fruit and Vegetable enterprises which are considered candidates for foundation funding, an alternative option is suggested earlier in section 5.8.6.

Another change which the Ministry has proposed (section 4.2) with respect to the Szeged Cereal Institute and the Szarvas Irrigation Institute is a form of privatization. The proposal is to make these institutes into public limited companies, possibly owned by their staff. This could be a suitable solution for the Cereal Institute which both produces and trades in seed and has a high market share for maize and sunflower seeds. It will, however, require that the institute be able to maintain its income from breeders rights and/or seed sales. For the Irrigation Institute we do not believe that the proposed option is a viable one and have suggested earlier that this Institute should become an Agricultural Research Council ecoregional center.

Against this background we believe that it is important to examine how a research service run by the proposed Research Council could be funded.

In the first instance a simple way of funding would be to grant the Research Council a sum equivalent to the Ministry of Agriculture's total KISEV/TKA research budget for 1990 (767 million forints), plus a share of the total OTKA and OMFB budgets

equivalent to the share of the agricultural and food industries in the national GDP. This would be more than sufficient to meet the budgets sugggested in Table 5.3 (after adjusting for inflation).

A second option would be to raise part of the funding (possibly to replace the OTKA/OMFB component) by a tax on production. We have seen that the total research budget represented 0.76% of the value of agricultural GDP. A production tax of 0.4% of agricultural GDP would raise 1.4 milliard forints (about 20 million U.S. dollars). Producers might bear such a tax, for example:

50 forints per ton of cereal would yield	600 million forints
1 forint per kg of beef would yield	120 million forints
1 forint per kg of pork would yield	1,000 million forints
1 forint per bottle of wine drunk locally would yield	320 million forints
1 forint per liter of beer drunk locally would yield	1,000 million forints

Taxation on production is, however, a difficult option to implement for commodities consumed internally. An alternative would be to collect a tax on exports or on consumption (as indicated above for beer and wine). Yet another approach would be to link a research tax to the profits of the proposed new agri- banks or credit agencies.

However, the danger of using such methods for financing research are that funding levels would be inconsistent from year to year. The present marketing problems with wine and cereals are relevant in this context. In the case of certain commodities such as fruit and vegetables, a tax would be difficult to collect. It could also be argued that it is not equitable to finance all research from a tax to which only certain commodities contribute. Indeed, any new tax is usually unwelcome. Furthermore, taxes on either production or consumption could effect demand elasticities which could influence the need for research. The data should, therefore, be regarded as purely indicative to show how small taxes applied to large taxable bases might create revenue for research, providing that neither demand nor supply were significantly affected by the taxes. However, taxation has been used to finance OMFB and OTKA. If the principle embodied in this approach could be modified to make agriculture pay directly for its public sector R&D, then it should be given consideration as a possible alternative financing mechanism.

Another possible way of stabilizing agricultural research funding over a transitional period of three or five years would be for the Government to seek some form of

structural adjustment loan during this period to enable it to meet the full cost of the proposed new service. A loan of 30 million U.S. dollars would meet a major part of the costs of reorganizing and operating the proposed ecoregional centers for three years, and might be linked to funding for new educational and extension services associated with the regional centers. It would, however, postpone rather than solve the issue of more dependable financing.

These various suggested funding mechanisms are all designed to stabilize the core budget and make provision for operational research costs to be derived from a competitive approach. At the same time, research institutes should be encouraged to seek supplementary funding through grants and contracts from outside of the Research Council funding stream. Such support might come from other Government sources such as the Ministry of the Environment, from private sector contracts, or through grants and contracts from international bodies such as the EEC or IAEA. **It should be borne in mind that the mission's suggestion of a public sector budget of 2.4 milliard (1990) forints represents what we regard as the minimum level of funding if the Hungarian agricultural and food industry is to remain competitive with Western Europe.**

The final issue which warrants mention here relates to the establishment of the Research Council. Should the Government wish to pursue this suggestion, the mission would recommend that it seek technical assistance from Western Europe through a funding mechanism such as that offered by PHARE or by the United Kingdom Know-How Fund in order to capitalize on the experience of agricultural research organizations in Western Europe.

CHAPTER 6

MANAGING CHANGE

6.1 INTRODUCTION

Chapter 5 discussed the kinds of changes in the structure, financing, and work of the research system that the mission suggested as desirable to develop an efficient system to meet the future needs of Hungarian agriculture.

As chapter 2 indicated, there is an overlap in research activities in several areas resulting in a surplus of researchers, buildings, land, and equipment (albeit limited). On the other hand, other areas of research clearly need to be strengthened. Thus, the overall future investment in research in terms of numbers of scientists may not vary greatly from the number currently employed. Comparison with other countries with similar research systems would support this.

The recent budget reductions noted in chapter 2 have resulted in a decrease in activities, including loss of staff. Unfortunately, there is no predetermined strategy to preserve the most vital and best elements of the research system.

The present system of financing research is meant to give priority to certain important areas. But it does so by providing all funding on a project-basis, leaving research institutes without any distinct core budget. The availability of fixed costs is thus becoming increasingly dependent upon the availability of project grants. This inevitably results in distortions of research programs to the detriment of long-term research.

The present budget situation greatly complicates the management of any changes to a new system. It will require a well thought out process to achieve the aims and objectives of the changes, while maintaining the most important, especially long-term, research activity of the existing system.

6.2 A PROCESS FOR CHANGE

As noted earlier, this paper is not intended to provide a blueprint of change. It is offered as a discussion paper with recommendations on issues where there appears to be a large measure of consensus nationally. However, there are many aspects of operationalising a strategy, in areas such as manning, financing, management, organization and structure, where a number of options are available. The ISNAR team has tried to present these options within an illustrative framework from which an appropriate national strategy could be developed.

We have done this by setting out a broad outline of the steps that are needed to implement the new system. Their goal is to create a consensus that is followed by appropriate action on a series of issues.

First and foremost is the necessity of achieving a consensus on the need for a unified and integrated national research system. Even in the absence of a consensus there still remains the need for major changes in the overall research complex to make it responsive to agriculture's future needs. Thus, if change has to be made, it should be made in a manner that will optimize the resources of the research system. The mission is aware that its proposals for a unified system relate closely to the on-going dialogue in Hungary regarding future science and technology policy. We have tried to formulate our concepts of an apex body with sufficient flexibility that they could be accommodated within the wide range of national science policy options now under discussion.

Second, there is a need to reach agreement on the method of funding a reorganized research service. All agricultural research systems need stable core funding to perform the wide variety of tasks related to the agriculture and natural resources sector. At the same time, the research system should be able to carry out contract research for the Ministry of Agriculture or other ministries in related fields. The service should be able to develop research contracts with other organizations, for example, universities, but not the agricultural universities exclusively. The major element here is, of course, the control of funding. A service without control of funding for research would not be able to develop a system of priorities, ensure that research institutes operated in an efficient manner, or effectively evaluate research work.

Third is the need for agreement to be reached on the management of the research system. This would entail not only the way in which the system was managed, but also the degree of control exercised by the unified system over the research program, while at the same time allowing scientists sufficient opportunities to engage in creative activities. Major issues to be dealt with include the development of an overall research strategy and decisions on priorities. Clearly, an agreement on these matters will have to be reached through an iterative process whereby research managers, researchers, the ministry, and the users of research can reach consensus and give management of the service the support required to direct the strategy.

The fourth area where agreement will need to be achieved concerns the linkages of the research council with other institutions involved in related research fields, including those agencies outside agriculture, for example environmental and non-agricultural scientific research in the biological and physical resources. Such an agreement will need to take account of the basic research in the biological and engineering laboratories of the non-agricultural universities and in relevant institutes of the Academy of Sciences.

Within the agricultural and natural resources sector, agreement will be needed to develop working relationships and linkages with the Ministry of Agriculture, agricultural universities, private sector R&D, agro-industry, and producer groups. **Particular attention will need to be given to how linkages could be developed with an emerging agricultural advisory and extension system, once the format of such a system has been agreed upon.**

One reason for exploring the creation of a totally new agency, such as an agricultural research council, is that it could serve as a neutral ground for bringing together the activities of what are currently a series of separate and, sometimes, competing organizations.

During the course of our visits and discussions at research institutes, we were made very aware of the need for changes in the research system and of the expectations that such changes could improve its effectiveness and efficiency. Thus, there would appear to be considerable institute support for the process of change to start as soon as possible. This, of course, is made all the more urgent by the current financial crisis, and the need for a well-structured financing system that removes some of the dependence on a multitude of short-term grants or loans to finance projects.

In order to move forward we would suggest that a timetable for action be developed. We were fortunate to have been able to discuss this at a series of meetings with a World Bank team studying agricultural support services in Hungary, and are aware of their proposals for a task force to simultaneously examine the education, research, and extension systems, and their interrelationship. While we agree on the need to examine these interrelations, we are also of the view that the present discussion paper could be used to promote early and specific discussion on the research system and possibly set the pattern for the discussions and approaches to the other systems within this subsector.

Thus, we strongly support the idea that the systems must be mutually interdependent, but we also recognize that each part of the overall system must design its future shape within that mutual interdependence and possibly at a different pace.

6.3 A TIMETABLE FOR CHANGE

Given the present situation, the following timetable is suggested for the immediate future.

February 1992. Workshop of research managers to review this discussion paper, and to establish the degree of consensus on the proposal for a unified national research system. Should there be substantial consensus on this, then working groups could be established to report on the functions, constitution, and funding of the system. These working groups would be drawn from the Ministries of Agriculture and Finance, the Academy of Sciences, and the agricultural universities, but should have a maximum size of no more than 12 to 15 persons.

June 1992. The working groups would report to the managers on the final shape of the report.

August 1992. The report would go to the Ministry and other interested parties for final agreement on the functions and constitution of a unified research system.

The stress is on building consensus since this is the key element in the "gradualism" which has characterized the recent approach to change in Hungary.

ANNEX 1

TERMS OF REFERENCE

The GENERAL terms of reference of the mission will be to conduct a diagnostic review of the organization and financing of agricultural research in Hungary with particular reference to identifying the changes that are desirable in the context of the transitions presently taking place in the Hungarian economy.

SPECIFICALLY the mission will examine and make recommendations where appropriate in the following areas:

1. *Agricultural Research Policy*

The current policies of the government related to agriculture, research, and technology development will be examined in order to understand the context under which the national agricultural research system is currently working.

2. *Organization and Management of the Research System*

The current organizational and management structures and mechanisms of the agricultural research system will be reviewed including those relating to:

- setting of priorities, planning, and coordinating research;
- formulating research programs and projects;
- monitoring and evaluating research programs and projects;
- disseminating information and technologies;
- managing research resources: human, physical, financial;
- linkages with extension and technology users;
- linkages with other sources of knowledge, both local and international, and with funding sources.

3. *Research Programs*

The current research programs conducted by the various institutions involved in agricultural research will be reviewed in broad outline, in order to assess how research supports the agricultural development goals of the country.

4. *Research Institutions*

The mandates of the various agriculture-related institutions, including those in universities, will be examined with the view to identifying any major opportunities for rationalizing the research system.

5. *Research Resources*

The human, physical and financial resources currently available for agricultural research will be reviewed in relation to the research programs to evaluate their adequacy.

6. *Research Information and Documentation Service*

The current library, documentation and publications services will be examined as a basis for assessing the adequacy of facilities and mechanisms for exchanging scientific and technological information with other countries, especially those in Europe.

ANNEX 2

ITINERARY AND PERSONS MET

MONDAY, NOVEMBER 4 - BUDAPEST

0800 EEC-PHARE PROGRAM - AID IMPLEMENTATION and COORDINATION UNIT

Dr. A. Zichy	Team Leader
Dr. G. Volpe	Senior Adviser
Mr. I. Munka	Executive Officer

0830 MINISTRY OF AGRICULTURE - DEPT. OF RESEARCH AND DEVELOPMENT

Prof. Dr. I. Gyürk	Director General
Mr. A. Szende	Project Manager PHARE-ISNAR Project
Mr. P. Szikszai	Project Manager PHARE-DANAGRO Project

1030 RESEARCH INSTITUTE FOR SOIL SCIENCE AND AGRICULTURAL CHEMISTRY (HUNGARIAN ACADEMY OF SCIENCES)

Prof. Dr. G. Várallay	Director
Dr. T. Németh	Deputy Director

1400 RESEARCH INSTITUTE FOR PLANT PROTECTION (HUNGARIAN ACADEMY OF SCIENCES)

Prof. Dr. Z. Király	Director
Dr. R. Gáborjányi	Deputy Director

1600 CENTRAL FOOD RESEARCH INSTITUTE (MINISTRY OF AGRICULTURE)

Dr. B. Czukor	First Deputy Director
Dr. M. Váradi	Scientific Deputy Director
Ms.M. Tardy Lengyel	Head, Dept. Public Relations

TUESDAY, NOVEMBER 5 - HERCEGHALOM - MARTONVASAR

0830 RESEARCH CENTRE FOR ANIMAL BREEDING AND NUTRITION (MINISTRY OF AGRICULTURE)

Prof. Dr. L. Fésüs	Director
Dr. I. Gundel	Deputy Director (Director of Animal Nutrition)

1400 AGRICULTURAL RESEARCH INSTITUTE (HUNGARIAN ACADEMY OF SCIENCES)

Prof. Dr. L. Balla	Director
Dr. T. Szondi	Deputy Director
Prof. Dr. T. Sutka	Head Genetics Dept.
Dr. E. Páldi	Head Biochemistry Dept.
Dr. B. Barnabás	Head Cell Biology Dept.
Dr. Z. Bedô	Head Wheat Breeding Dept.
Dr. L. Szunics	Head Wheat Resistance Breeding Dept.
Dr. M. Jolánki	Head Wheat Agronomy Dept.
Dr. C.L. Marton	Head Maze Breeding Dept.
Dr. Z. Berzsenyi	Head Maze Agronomy Dept.
Mr. T. Tishner	Head Central Laboratories

WEDNESDAY, NOVEMBER 6 - KECSKEMET

0830 INSTITUTE OF VITICULTURE AND OENOLOGY (UNIVERSITY OF HORTICULTURE AND FOOD INDUSTRY BUT FORMERLY MINISTRY OF AGRICULTURE)
Dr. Z. Kerényi Deputy Director

1330 VEGETABLE CROPS RESEARCH INSTITUTE (FORMERLY A MINISTRY OF AGRICULTURE RESEARCH INSTITUTE NOW A PUBLIC ENTERPRISE SEED PRODUCTION AND RESEARCH COMPANY UNDER THE MINISTRY)
Dr. P. Milotai Breeder
Dr. K. László Breeder

THURSDAY, NOVEMBER 7 - BUDAPEST

0800 FOREST RESEARCH INSTITUTE (MINISTRY OF AGRICULTURE)
Prof. Dr. A. Bondor Director General
Dr. T. Gergácz Head Sárvár Research Station
Dr. T. Sárvári Scientific Secretary
Dr. K. Rédei Head Kecskemét Research Station
Dr. B. Héjj Sopron Research Station

1100 RESEARCH INSTITUTE FOR GEODESY, CARTOGRAPHY AND REMOTE SENSING (A PUBLIC ENTERPRISE OF THE MINISTRY OF AGRICULTURE)
Dr. G. Csornai Head Agricultural Applications Dept.

1400 NATIONAL COMMITTEE FOR TECHNOLOGICAL DEVELOPMENT (OMFB)
Dr. S. Bottka Vice President
Dr. C. Póder
Mr. G. Fülöpp

1700 Dr. Biacs (DIRECTOR OF THE CENTRAL FOOD RESEARCH INSTITUTE)

1900 WORLD BANK MISSION REVIEWING RESEARCH, EDUCATION AND EXTENSION
Mr. C. Warnaars
Mr. P. Oram

FRIDAY, NOVEMBER 8 - GODOLLO

0800 MINISTRY OF AGRICULTURE - DEPT. OF RESEARCH AND EXTENSION
Prof. Dr. I. Gyürk Director general
Dr. M. Pécsi Head, Research Section

0900 NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING (FORMERLY A MINISTRY OF AGRICULTURE RESEARCH INSTITUTE NOW A MINISTRY PUBLIC ENTERPRISE PRIMARILY INVOLVED IN 'TESTING' PARTIALLY IN 'RESEARCH')
Prof. Dr. L. Tóth Director
Mr. I. Buzi Deputy Director
Dr. A. Fekete Head Automatic Control Division
Dr. I. Hajós

1100 Prof. Dr. P. Stefanovits HUNGARIAN ACADEMY OF SCIENCES, Chairman of the Agricultural Section

1300 AGRICULTURAL BIOTECHNOLOGY CENTRE (MINISTRY OF AGRICULTURE)

Prof. Dr. E. Balázs	Director
Dr. G. Vajda	Deputy Director, Institute of Animal Science
Dr. B. Asbóth	Deputy Director, Institute for Biochemistry and Protein Research
Prof. Dr. L. Orosz	Director, Institute of Molecular Genetics

1500 GODOLLO UNIVERSITY OF AGRICULTURAL SCIENCES

Prof. Dr. Károly Kocsis	Rector

SUNDAY, NOVEMBER 10 - EGER/KOMPOLT/SZILVASVARAD

0800 KOMPOLT AGRICULTURAL RESEARCH INSTITUTE (GODOLLO UNIVERSITY)

Dr. A. Fehér	Director
Dr. N. Béla	Deputy Director
Mr. F. Fehér	Environmental Economist
Ms. M. Perényi	Computerized Information System

1100 SZILVASVARAD STATE FORESTRY FARM AND LIPPIZANER STUD

1300 BUKK NATIONAL PARK

1600 EGER COOPERATIVE FARM WINERY

MONDAY, NOVEMBER 11 - EGER/KOMPOLT

0800 RESEARCH INSTITUTE FOR VITICULTURE AND OENOLOGY AT EGFR (UNIVERSITY OF HORTICULTURE AND FOOD INDUSTRIES, FORMERLY A MINISTRY INSTITUTE THEN PART OF A WINE ENTERPRISE)

Dr. O. László	Director
Ms. E. Borbás	Sales Executive EGERVIN WINE ENTERPRISE

1300 FUZESABONY STATE FARM

Mr. L. Szücs	Director

1500 KOMPOLT AGRICULTURAL RESEARCH INSTITUTE (GODOLLO AGRICULTURAL UNIVERSITY)

Dr. A. Fehér	Director
Dr. B. Nagy	Deputy Director
Prof. Dr. I. Bócsa	Alfalfa Breeder

plus all other scientific staff

TUESDAY, NOVEMBER 12 - NYIREGYHAZA/DEBRECEN

1000 RESEARCH CENTRE OF THE VETOMAG SEED GROWING AND TRADING ENTERPRISE IN NYIREGYHAZA:

Dr. T. Lazányi	Director
Dr. J. Rajthár	Deputy Director

1300 DEBRECEN AGRICULTURAL UNIVERSITY

Prof. Dr. G. Szász	Pro-rector
Prof. Dr. L. Nyíri	Director Karcag Research Institute of the University
Dr. G. Nagy	Dean, Faculty of Agronomy

WEDNESDAY, NOVEMBER 13 - KARCAG/NADUDVAR/NAGYHEGYES/SZARVAS

0800 leave for visit to HORTOBAGY area

1000 KARCAG RESEARCH INSTITUTE (DEBRECEN AGRICULTURAL UNIVERSITY)
Prof. Dr. L. Nyíri Director and staff

1300 KITE (ASSOCIATION FOR PRODUCTION OF MAIZE AND INDUSTRIAL PLANTS) NAEDUDVAR
Mr. E. Rácz Managing Director

1500 NAGYHEGYES COLLECTIVE FARM
Mr. P. Vass Director

THURSDAY, NOVEMBER 14 - SZARVAS/SZEGED

0800 FISH CULTURE RESEARCH INSTITUTE (MINISTRY OF AGRICULTURE)
Dr. L. Váradi Director
Dr. F. Pekár Scientific Secretary

1330 IRRIGATION RESEARCH INSTITUTE (MINISTRY OF AGRICULTURE)
Dr. I. Lelkes Director
Dr. V. Hanyecz Deputy Director
Dr. T. Kereszturszki

FRIDAY, NOVEMBER 15 - SZEGED/TAPIOSZELE/BUDAPEST

0800 CEREAL RESEARCH INSTITUTE (MINISTRY OF AGRICULTURE)
Dr. T. Proksza Deputy Director
Dr. S. Szél Head of Corn Program
Dr. L. Gáspár Director of Finance
Dr. L. Szücs Director of Administration

1600 GERMPLASM BANK OF THE SEEDS AND QUALITY CONTROL INSTITUTE TAPIOSZELE

SUNDAY, NOVEMBER 17 - BUDAPEST

1700 MEETING WITH CORNELL UNIVERSITY TEAM VISITING HUNGARIAN UNIVERSITIES
Dr. L. Zuidema Leader
Dr. H. Aldwinkle Plant Pathology
Dr. H. Van As Soil Science
Dr. G. Harzeina Food Science

MONDAY, NOVEMBER 18 - MOSONMAGYAROVAR/SOPRON

1100 PANNON UNIVERSITY OF AGRICULTURAL SCIENCES, AGRICULTURAL FACULTY MOSONMAGYAROVAR
Prof. Dr. J. Ivánesics Director of Research and Head of Animal Breeding Department

1500 LAJTA-HANSAG STATE FARM DAIRY

1830 FORESTRY RESEARCH INSTITUTE (MINISTRY OF AGRICULTURE) SOPRON STATION

TUESDAY, NOVEMBER 19 - SOPRON/SARVAR/KESZTHELY

0800 FORESTRY RESEARCH INSTITUTE SOPRON STATION

Prof. Dr. A. Bondor	Director General Forestry Research
Dr. B. Illyés	Economist, Director of Station
Dr. E.G. Fülürer	Ecologist

1000 UNIVERSITY OF FORESTRY AND WOOD SCIENCES SOPRON

Prof. Dr. A. Winkler	Rector

1230 FORESTRY RESEARCH INSTITUTE SARVAR STATION

Dr. J. Gergácz	Director of Station

1330 STATE FORESTRY FARM NEAR SARVAR

1500 PANNON AGRICULTURAL UNIVERSITY, FACULTY OF AGRONOMY, KESZTHELY

Prof. Dr. P. Horn	Rector
Prof. Dr. M. Palkovics	
Dr. L. Csató	(Kaposvár)
Ms. I. Walcz	Pathologist (Iregszemcse)
Dr. J. Bukai	Deputy Director (Iregszemcse)

1900 Meeting with World Bank Team

WEDNESDAY, NOVEMBER 20 - KESZTHELY/KAPOSVAR/BICSERD/BUDAPEST

0900 PANNON UNIVERSITY, FACULTY FOR ANIMAL BREEDING, KAPOSVAR

Prof. Dr. P. Horn	Rector

BIOLOGY CENTRE

Dr. G. Pászthy	Director

LIVESTOCK FACILITIES AND FARMS
Dr. L. Csat'

NATIONAL EQUESTRIAN CENTRE

UNIVERSITY DEER FARM near BOSZENFA

1500 FORAGE RESEARCH INSTITUTE IREGSZEMCSE (PANNON UNIVERSITY) - SUBSTATION AT BICS

Dr. L. Takács	Director
Ms. I. Walcz	Plant Pathologist

THURSDAY, NOVEMBER 21 BUDAPEST

am Report Drafting

1430 MINISTRY OF AGRICULTURE

Dr. M. Pécsi	Head Research Section

FRIDAY, NOVEMBER 22 BUDAPEST

0800 RESEARCH INSTITUTE FOR AGRICULTURAL ECONOMICS

Dr. G. Varga	Deputy Director
Dr. T. Vjhelyi	Manager of Marketing Studies

1130 AGROINFORM

Dr. S. Szabó	Director

1330 UNIVERSITY OF HORTICULTURE AND FOOD INDUSTRY

Prof. Dr. P. Vig	Vice-rector
Prof. Dr. J. Farkas	Vice Dean, Faculty of Food Industry
Dr. K. Hrotko	Vice Dean, Faculty of Horticulture
Dr. P. Lukács	Manager of Foreign Relations

SATURDAY, NOVEMBER 23 BUDAPEST

Report drafting

SUNDAY, NOVEMBER 24 BUDAPEST

1700 Meeting with World Bank Team

MONDAY, NOVEMBER 25 BUDAPEST

Report drafting
Meeting with World Bank team

WEDNESDAY, NOVEMBER 27

Report drafting

THURSDAY, NOVEMBER 28

Report drafting

FRIDAY, NOVEMBER 29

Presentation of Executive Summary
Dr. I. Gyürk
Dr. M. Pecs
Dr. A. Zichy