منظمة الأغذية والزراعة للأمم المتحدة

Reef ريف

وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture

National Strategy for Sustainable Honey Bee Health and Disease Control in KSA

Dr. Giovanni Formato – Riyadh 26 June 2022 - BEE/051/2022/7

FAO KSA Technical Cooperation Programme

Strengthening MoEWA's Capacity to implement its Sustainable Rural Agricultural Development Programme (UTF/SAU/051/SAU)

2 Outline of presentation

1. Background
2. Methodology
3. Current situation on HBH and HB disease control
4. Benchmarking process and gap analysis
5. National HBH strategic framework
6. Mitigation measures
7. Action plan

Apiary of traditional hives
in Makkah Region

3 Outline of presentation

1 **Background**

Apiary of traditional hives
in Makkah Region

Relevance of the sector in KSA

1

Beekeeping is a relevant sector in KSA because of the role of bees for ensuring forest and environment regeneration and biodiversity, adaptation to climate change. Moreover, bees increase quality and quantity of agricultural productions.

Honey bees pollinate 80% of all flowering plants and more than 90% of the leading global crop types, improving quantity and quality of productions.

Bees on sunflower - Al Baha 23.06.2022

Beekeeping industry in KSA

1

Beekeeping maintains livelihoods and support attainment of SDGs.
Bees provide humans with valuable products (honey, pollen, royal jelly, wax, venom) and services (pollination, apitherapy, apitourism and environmental monitoring).

Beekeeping industry in KSA plays a significant role in increasing the incomes of rural households:
about 72.800 family members
(5.6 people/household).

Beekeeping contribute to attainment of the Sustainable Development Goals (SDGs)

Type of beekeeping in KSA

1

In the KSA there are 13.000 beekeepers c.a.

Because the seasonal shortages of bee forages, draughts and geographic differences in bee forage availability, in KSA more than 95% of beekeepers keep bees in migratory apiaries.

Migratory apiary in Medinah Region. Mobile apiaries are the best solution to follow flowerings of limited bee forages.

1- Background

1

Using artificial feeds based on sucrose syrups and integrators (e.g. pollen supplements, pollen substitutes) is very frequent in in KSA beekeeping.

Feeds in use in KSA:
Megabee–Protein supplement (up)
Ultra bee–Protein pollen substitute (down)

1

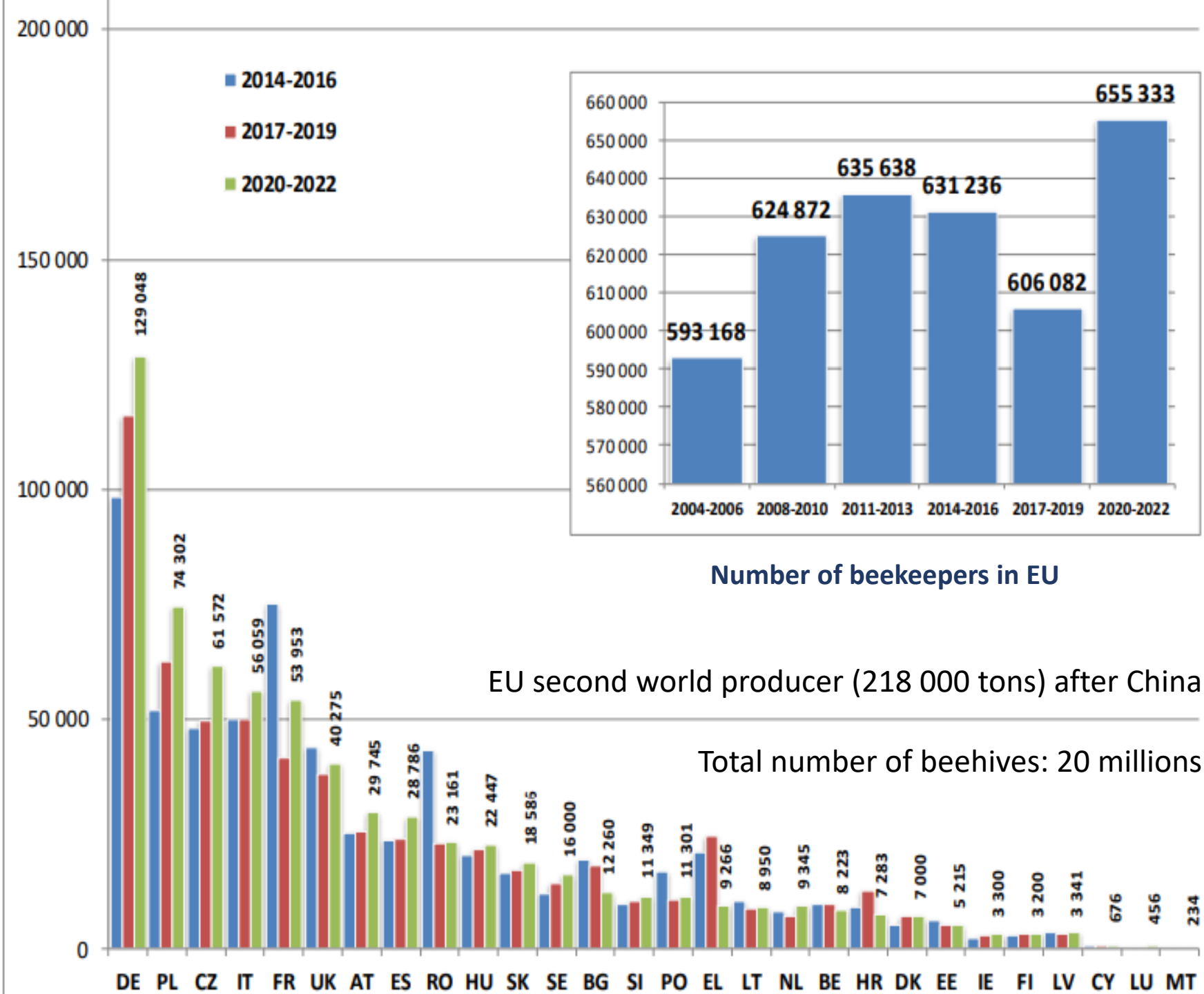
Beekeepers or “honey producers”?

About half of the migratory beekeepers do not take care in managing bees and has not knowledge on biosecurity measures as they just “use” imported bees to produce.
At they end of the productive season they leave the activity.

This increase the risk of spread of honey bee diseases.

Honey seller in KSA

Benchmark!



EU second world producer (218 000 tons) after China

Total number of beehives: 20 millions

1

Beehive holdings and production systems

The mean colony holding size is of 570 colonies per beekeeper.

71% of colonies are kept in traditional hives, that produce 3.25 Kg of honey/year

29% of the colonies are kept in modern hives, that produce 6.5 kg of honey/year

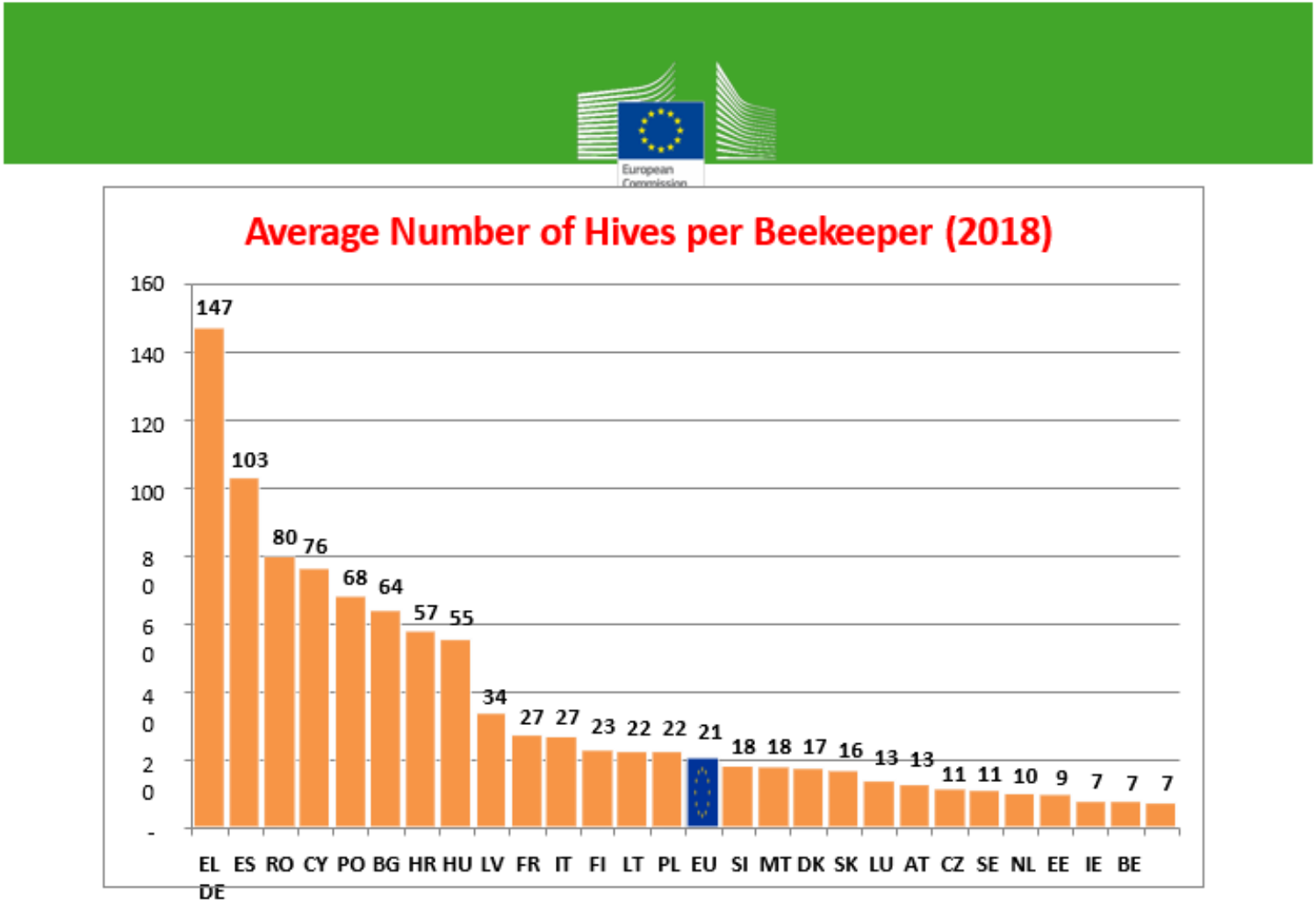
Modern hive, with number ID
Al Baha 23.06.2022

Open jars to dehydrate honey
Al Baha 23.06.2022

1 - Background

Benchmark!

1

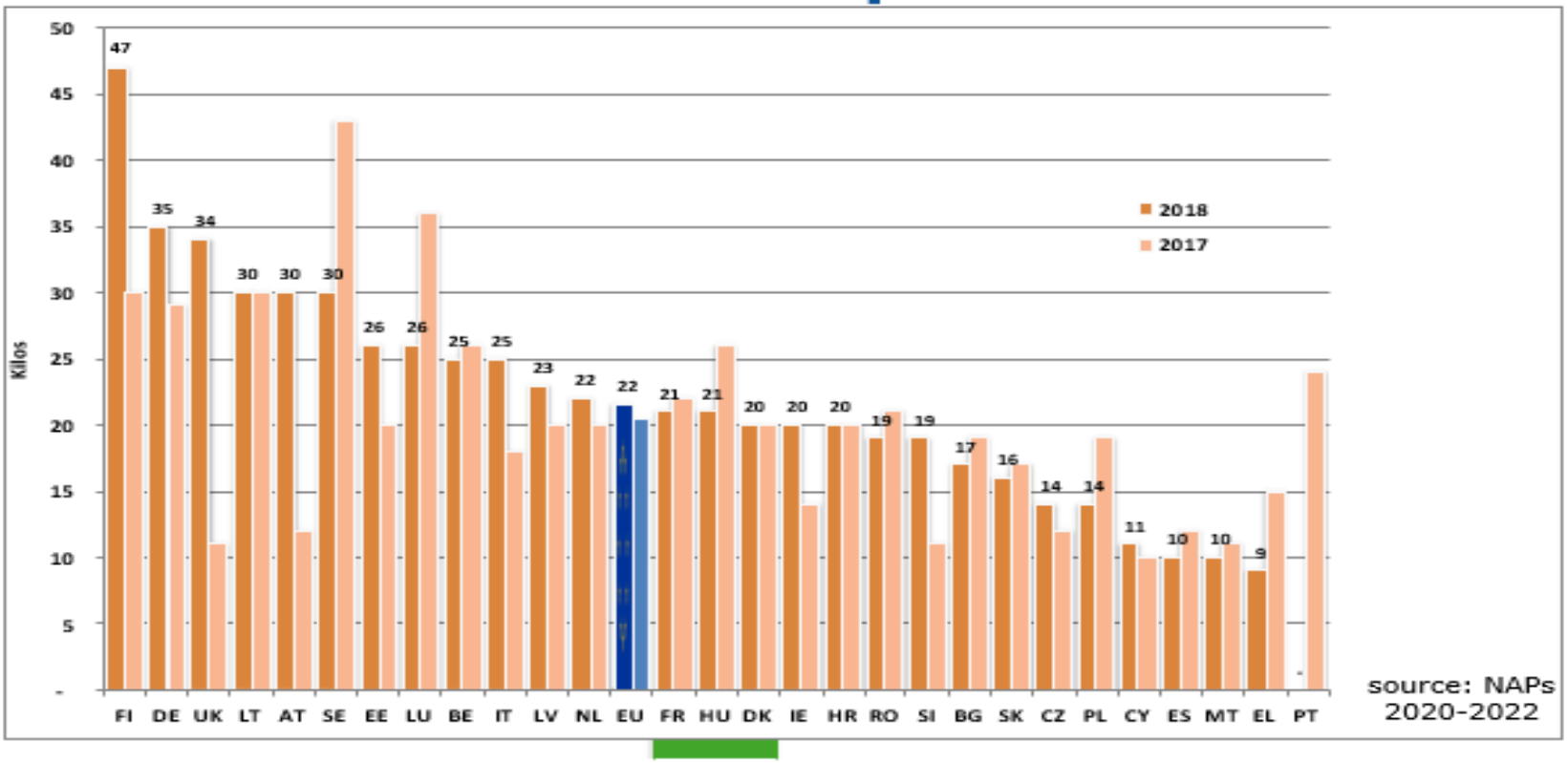


1 - Background

Benchmark!

1

EU Average Yield in Kg of Honey per Beehive and per Year



HONEY BEES POPULATIONS AND IMPORT

1

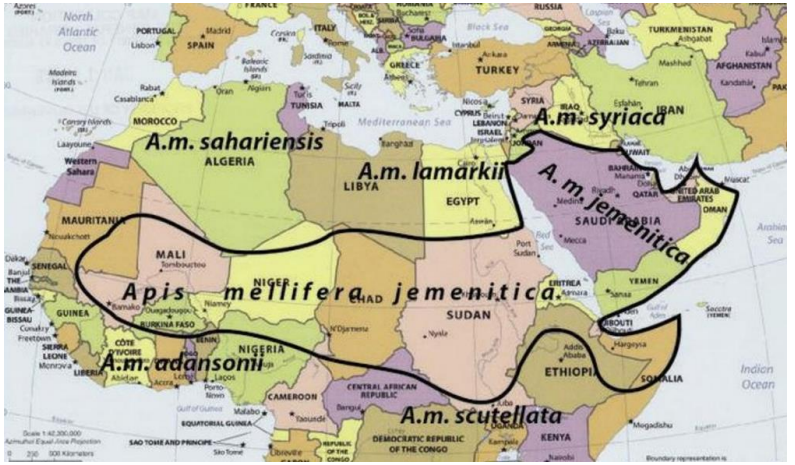
Approximately *1 million of colonies* kept in Saudi Arabia are native populations of *Apis mellifera jemenitica.*

*T*he remainders (about 1,3 millions in 2021) are Egyptian hybrids (above all carnica and ligustica) of *Apis mellifera* that are bigger, more productive, but not adapted to the KSA climate.

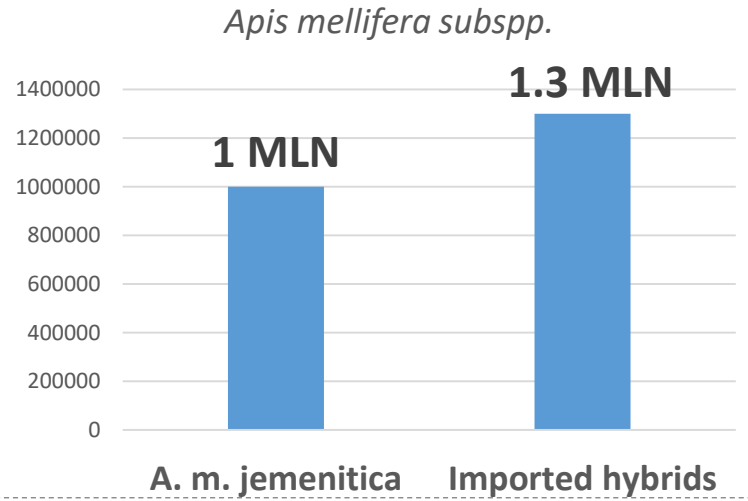
They usually die after few (2) months from importation.

Costs:

- 140 SR/package = 182 millions SR
- 2 SR/package = 2.6 mil SR (controls)



Apis mellifera jemenitca geografical distribution



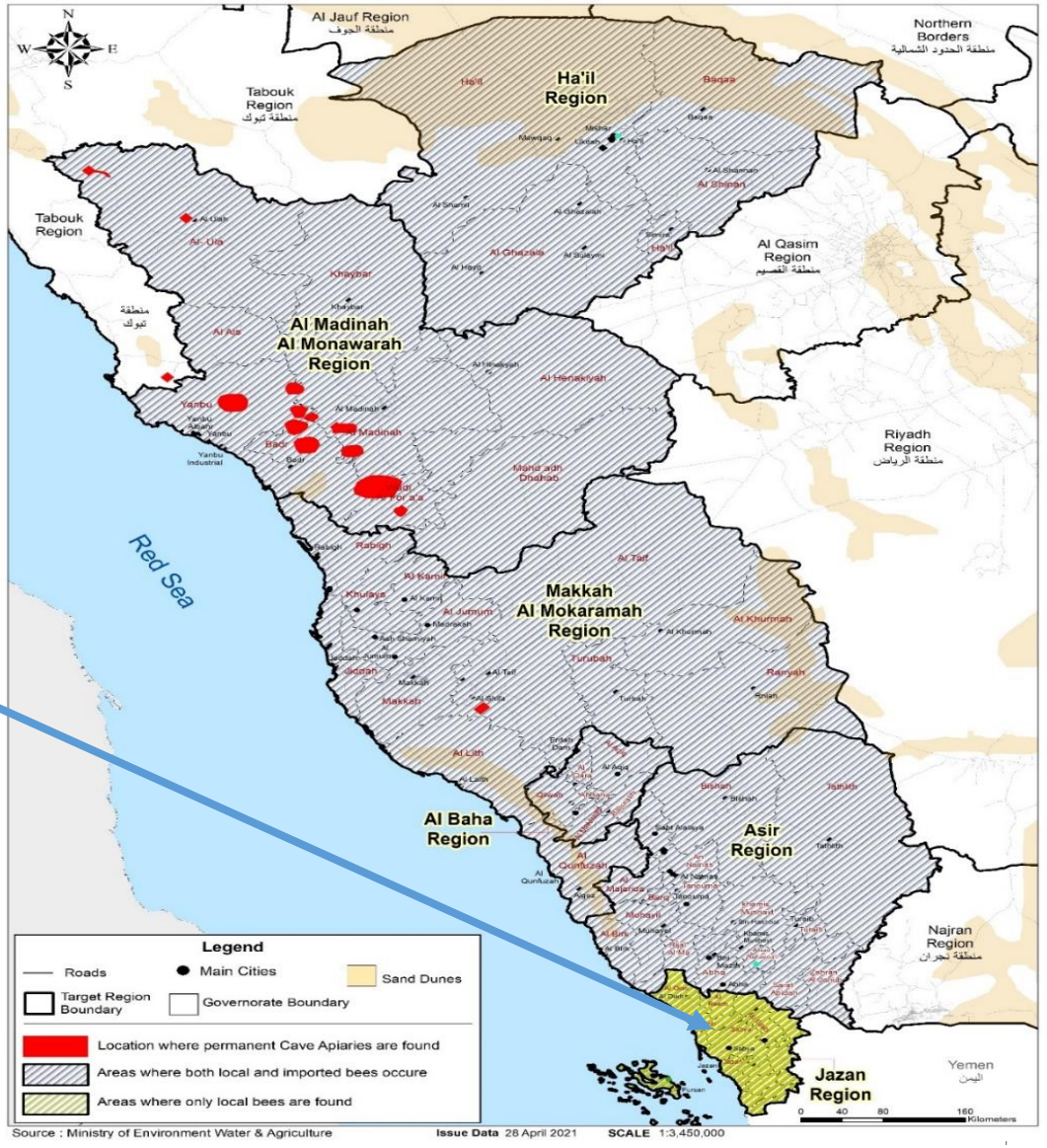
https://holmakhdar.org/resources/studies/3342/

1

HONEY BEES POPULATIONS DISTRIBUTION IN KSA

Both races are widely used in most parts of the country and the project target regions

Only in Jazan Region there is a wide area where hybrid imported honey bees are not allowed to enter.



1

Queen rearing Centres

To breed, improve and distribute local honey bees (*A.m. jemenitica*), 10 queen rearing centres are available in KSA.

MEWA, has established 4 new queen rearing centers at different regions of the country.

Centres: Al-Baha (Buljarshi), Aseer (Abha, Rajal Alma and Namas), Jazan (Abu Arish and Al Edabi), Mekha (Taif), Riyadh, Medina, Qassim (Unizah).

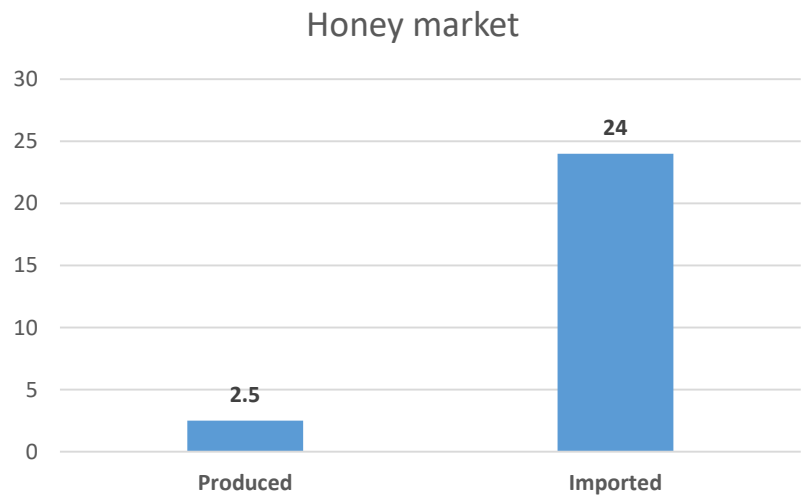
The centers lack qualified staff and optimum facilities to effectively run the queen rearing activities.

Queen rearing Center in Al Baja

1- Background

1

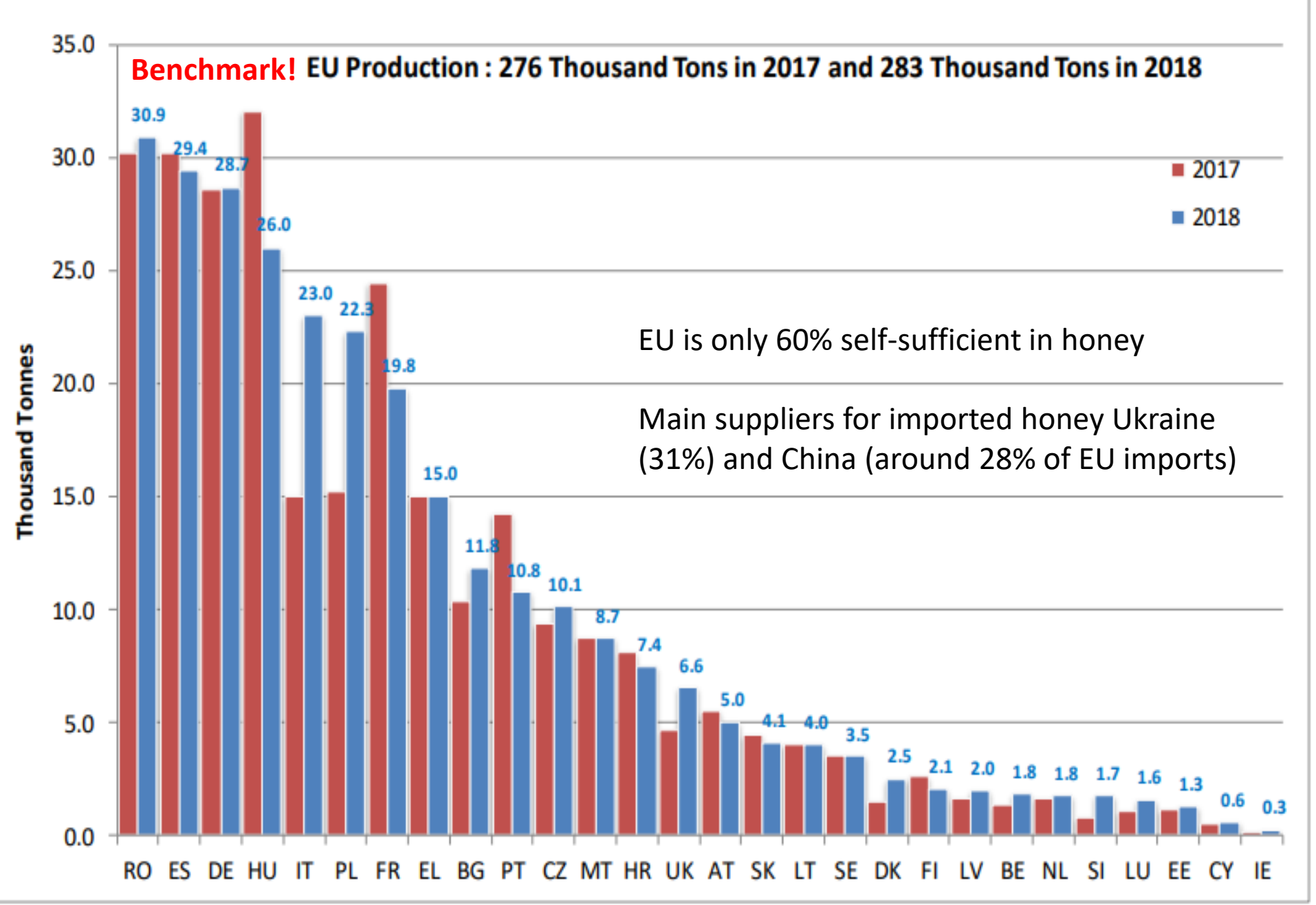
The country produces 2.55 thousands of tons of honey annually, and imports about 24 thousands of tons of honey.



Honey production volumes (in kg) of KSA by region and year

Regions	2017	2018	2019
Riyadh	14 902	707 10	804 13
Makkah	845 283	937 890	110 868
Al-Madinah	27 132	247 28	689 29
Al-Qassim	23 368	718 22	043 23
\Eastern Province	3 764	807 3	785 3
Asser	674 593	735 681	164 778
Tabuk	251 956	212 843	232 400
Hail	135 000	113 091	124 045
Jazan	305 676	951 328	413 330
Najran	161 250	573 165	411 163
Al-Baha	75 072	026 74	549 75
Al-Jouf	4 000	465 3	732 3
Total	**2 521 996**	**100 536 2**	**145 646 2**

Source: Ministry of Environment Water and Agriculutre, 2019



source: NAPs 2020-2022

EU Average Unit Value for Exported Honey (€/kg) by Destination

1

The average prices of locally produced honeys (even because of traditional-religious use) are 7-10 times higher than the average price of honey in US or in EU.

High prices and low amounts of local honey increase the risk of frauds in the sector.

	2018	2019	2020	2021	2021/2020 %
United Kingdom	4.83	3.98	3.75	4.94	+31.9%
Switzerland	5.53	5.41	5.68	5.80	+2.1%
Saudi Arabia	6.88	7.53	6.43	6.04	-6.0%
USA	5.89	6.29	5.77	6.67	+15.6%
Japan	5.22	5.75	6.53	6.88	+5.3%
Canada	4.15	3.89	3.86	4.08	+5.7%
U.A.Emirates	7.65	7.51	7.72	8.10	+4.9%
Israel	2.96	2.84	2.82	2.81	-0.5%
Norway	5.99	5.39	5.27	5.74	+8.8%
China	6.02	7.44	6.32	5.87	-7.1%
Morocco	1.97	2.80	2.57	3.43	+33.7%
Algeria	3.25	3.14	3.85	3.29	-14.4%
Hong Kong	6.98	6.99	6.79	6.63	-2.5%
Peru	2.80	3.16	2.74	2.87	+4.8%
Jordan	5.04	4.85	4.79	5.42	+13.0%
Extra EU	**5.40**	**5.26**	**5.21**	**5.76**	+10.6%

Source : Eurostat Comext

Outline of presentation

2 **Methodology**

Apiary of traditional hives
in Makkah Region

2 - Methodology

The situational analysis for HBH in KSA considered:

2

4 field missions in 5 regions, 42 apiaries visited, and semi-structured interviews on colony losses and bee management (GBPs, BMBs) were realized.
Moreover, 4 surveys for HBH risk assessment were set-up and administered. 39 meetings: with MoEWA officers (7), beekeepers single (35) or Associations (2) were used for consultation, data collection and validation.

Activity	N.
Field missions	4
Regions visited	5 (Medinah, Makkah, Jazan, Riyadh and Al Baha)
Apiaries visited	33
Varroa tests	63
Samples collected	161
Surveys for beekeepers	2
Surveys for MoEWA Officers	2
Meetings with beekeepers	35 (1 queen exporter from Egypt, and 1 retailer)
Meeting with Beekeepers' Associations	2
Meetings with MoeWA	2 Central, 5 Regional Offices

Outline of presentation

3 **Current situation on HBH and HB disease control**

Apiary of traditional hives
in Makkah Region

Good beekeeping practices (GBPs)

3

GBPs are all those practices able to prevent risks for honey bee/human health and protect the environment that are not related to a specific HB disease.

In KSA it was possible to notice the following practices that should be kept more into account by beekeepers: …

3 - Current situation on HBH and HB disease control

Adoption of modern beehives

3

Knowledge on HB diseases: how to recognize and treat them

3

3 - Current situation on HBH and HB disease control

Lack of awareness on the impact of medicines and medicated feeds on hive products: residues and AMR

3

3 - Current situation on HBH and HB disease control

Respect the carrying capacity of the areas where the apiary is located

3

Carrying capacity should be respect to avoid starvation and higher risk to spread diseases.

Migratory beekeeping itself represents a risk for HBH.
This means that beehives that are moved must be healthy to avoid spread of diseases.

3 - Current situation on HBH and HB disease control

Do not feed the bees with hive products

3

3 - Current situation on HBH and HB disease control

Do not water bees collectively

3

3 - Current situation on HBH and HB disease control

Remove promptly dead hives/bees

3

What risks for HBH in KSA? (1/2)

3

We started analyzing
risks for HBH responsible of **high HB losses**:

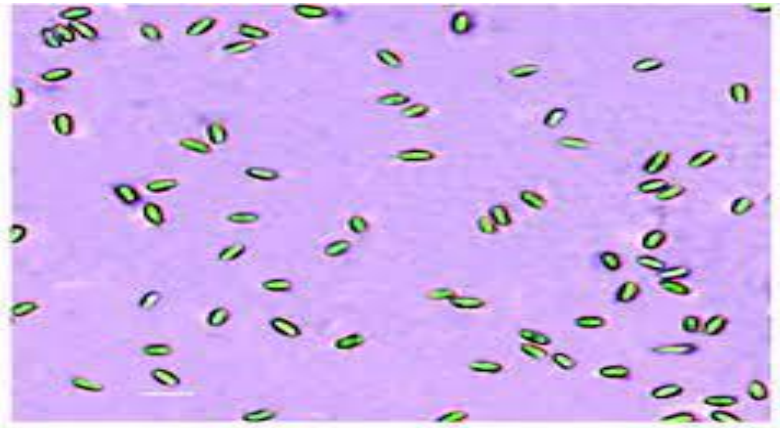
1) **HB winter mortality**
2) **WOAH listed diseases**:
   -Varro0sis (*Varroa destructor*),
   -Tracheal mite (*Acarapis woodi*),
3) **nosemosis** (*N. apis* and *N. ceranae*)
4) **virosis** associated to the above-mentioned diseases.

We didn't consider the WOAH diseases that are associate to a too low mortality rate:

- Bee louse (*Braula coeca*),
- American foulbrood – AFB (*P. larvae*)
- European foulbrood - EFB (*M. plutonius*).

They will be included in National Surveillance Programme

Adult honey bee infested by *Varroa destructor*



Nosema spores from intestinal content of adult honey bees

Region	N. apiaries inspected	Modern beehives /Traditional (Modern/Trad. %)	Average Winter mortality rate (declared by beekeepers)	N. samples taken for nosema and virosis (to send to IT lab)	N. Hives with varroa infestation levels >2%	Apiaries with problems with varroa
Madinah	7	259/2000 (11.5% Vs 88.5%)	55%	33	6 hives (22 hives sampled)	3
Makkah	9	590/1685 (25.9% Vs 74.1%)	39.6%	46	5 hives (23hives sampled)	2
Jazan	8	1080/1820 (37.3% Vs. 62.7%)	30.7%	23	7 hives (18hives sampled)	2
	Total 24 apiaries	1929 modern/5505 traditional hives. **Modern 25.9%; traditional 74.1%**	**Average Winter mortality 41.7%**	**Total 102 samples**	**18 hives** (63 hives sampled) with 38% average infestation level	**7 out of 24 apiaries** (**29.2% of apiaries**)

The 161 samples (mostly adult honey bees) in alcohol were sent to IZSLT Italian laboratory by DHL on 20th of June 2022 (Fig. 25).

3 - Current situation on HBH and HB disease control

Prevalence of Nosema infection, virosis (CBPV) and acarapisosis

3

To define the prevalence of Nosema infection, the species of Nosema interested, the presence of Acarapis Woodi, and of virosis, the 161 samples (mostly adult honey bees) were sent in alcohol to IZSLT laboratory in Rome (IT) on 20th of June 2022.

3 - Current situation on HBH and HB disease control

What risks for HBH in KSA? (2/2)

3

5) Migratory beekeeping
(95% of beekeepers);

6) Import of honey bees
(1.3 million of packages/year);

7) Feedings, above all containing hive products like pollen or honey, imported by China.

8) Phytotherapeutic products misuse even with airplanes.

ONE-HEALTH APPROACH: the RISK FOR HUMAN HEALTH linked with the residues in hive products and AMR.

Phytotherapeutic products (PPPs) must be used prudently and properly, in respect of the bees and of the environment.

Adult honey bees dead after PPP treatment

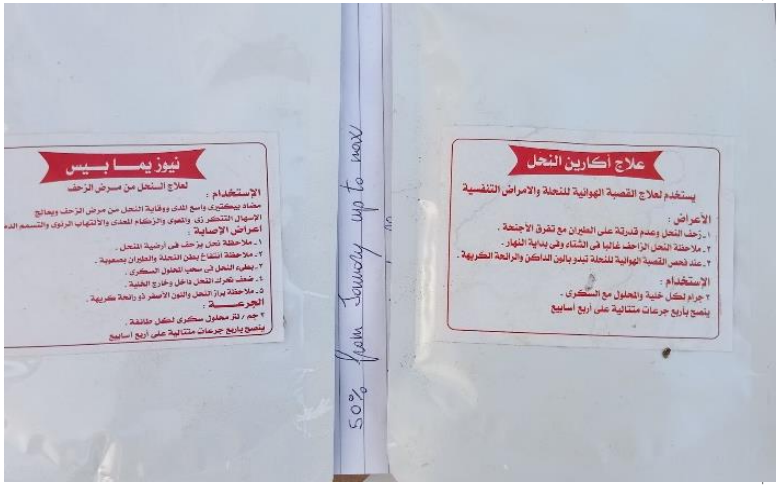
3 - Current situation on HBH and HB disease control

Biosecurity measures and sustainability in KSA beekeeping

3

1) Low adoption/Knowledge on biosecurity measures in beekeeping;
2) Wide use of unregistered antimicrobials (antibiotics included)
3) Lack of awareness on the impact of the medicines on safety of hive products (residues) and AMR
4) No organic medicines registered for bees

Not registered antimicrobiasl used by KSA Beekeepers (3 of the 4 are antibiotics)



Large spectrum antibiotics in use in Egypt

3 - Current situation on HBH and HB disease control

Veterinary quarantine and border control for imported bees

3

KSA is one of the largest importer of honey bee packages in the world: 1.3 millions of packages/year. Bee packages are only allowed and arrive at the international airports of Riyadh and Jazan. Two mobile clinics are available for laboratory analysis.

KSA, as member of WTO, WOAH and GCC should follow the WTO SPS agreement and the WOAH Terrestrial HBH Code standards (Vol 2, Sec. 9, pag. 531-548). No specific measures are foreseen for nosemosis.

At the border inspection points clinical examinations should be foreseen, as well as sampling and laboratory testing. So far, no clinical controls nor samplings or risk analysis are applied to control activities.

Riyadh International airport

Two mobile laboratories will be available at the Riyadh airport

The MoEWA organizational framework

3

MoEWA has a great responsibility in managing and keeping under control the risks for HBH and disease transmission, working at different levels:

- regulatory (e.g. veterinary medicinal products beekeeping national register, imports, etc.)
- Institution of disease surveillance systems
- early warning and rapid response systems
- contingency plans
- veterinary laboratory diagnostic capacity,
- veterinary extension services
- veterinary quarantine and border control,
- risk analysis
- academia and research centers,
- Honey bee welfare

1. Assessment of the current activities in the honey bee sector: survey for officers that work at the National level in MOEWA.

2. Bee Health: general structure of the strategy

According to your knowledge, write an "X" on the answer you choose:

Question	Yes	No	I don't know
1) Does it exist in the KSA a national strategy for Honey bee health and honey bee disease control?	○	○	○
2) Do you know the prevalence and incidence of the main honey bee diseases along the beekeeping season in KSA	○	○	○
3) Do you adopt early diagnosis for honey bee diseases?	○	○	○
3) Does it exist a KSA national action plan for Honey bee health and honey bee disease control?	○	○	○
4) Do you have a surveillance system for varroa?	○	○	○
5) Do you have a surveillance system for nosemosis?	○	○	○
6) Do you have a surveillance system for AFB?	○	○	○
7) Do you have a surveillance system for EFB?	○	○	○
8) Do you have a surveillance system for poisonings of honey bees?	○	○	○
9) Do you have a surveillance system at the national level on the health of imported bees in KSA?	○	○	○
10) Do you have a yearly report on the results of the controls on health of imported bees in KSA?	○	○	○
11) Do you have a system that prevent introduction of exotic diseases (e.g. Tropilaelaps mite, SHB) at the borders?	○	○	○
11) Do you have extension services from MoEWA dedicated to beekeepers?	○	○	○
12) Does it exist a specific training in KSA for officers involved in the sector of bee health?	○	○	○
13) Is a risk-based approach in KSA adopted for bee health and food safety controls of hive products?	○	○	○
14) Do you have a National Reference Laboratory for bee health (diseases and poisoning) in the KSA?	○	○	○
16) Do you have a national team of experts in bee health and beekeeping that you could refer in case of need?	○	○	○

2. Assessment of the current activities in the honey bee sector: survey for officers that work at the Regional/Governorate level in MOEWA.

1. Bee Health: general structure of the strategy

According to your knowledge, write an "X" on the answer you choose:

Question	Yes	No	I don't know
1) Do you know the prevalence and incidence of the main honey bee diseases along the beekeeping season in your Region/Governorate?	○	○	○
14) Do you know where to send samples to verify presence of honey bee diseases?	○	○	○
15) Do you know where to send samples to verify presence of pesticides in case of honey bee mortality?	○	○	○
17) Do you have a regional/local team MoEWA of experts in bee health and beekeeping that you could refer in case of need?	○	○	○

2. Bee health: training

According to your knowledge, write an "X" on the answer you choose:

Question	1	2	more than 2	None
1) How many training events specific on bee health and control have been organized by MoEWA for officers at the Regional/Governorate level in 2021-2022?	○	○	○	○
1) How many training events specific on bee health and control have been organized by MoEWA for beekeepers at the Regional/Governorate level in 2021-2022?	○	○	○	○
3) How many officers of MoEWA are specialized in the beekeeping sector in your Governorate/Region?	○	○	○	○

3. Bee health at the apiary level

According to your knowledge, write an "X" on the answer you choose:

Question	1-5	6-15	more than 15	None
1) How many inspections at the apiary level were done in your Region/Governorate in 2021-2022?	○	○	○	○
2) How many cases of varroa you registered at the apiary level in your Region/Governorate in 2021-2022?	○	○	○	○
3) How many cases of nosemosis you registered at the apiary level in your Region/Governorate in 2021-2022?	○	○	○	○
4) How many cases of poisonings of honey bees you registered at the apiary level in your Region/Governorate in 2021-2022?	○	○	○	○

3. Survey for beekeepers to prioritize the recommendations for MoEWA

Governorate..... Date.....

Recommendations to the Government on bee health	Give a priority from 1 (high) to 3 (no need)		
Registration of beekeepers in the National Registry	◯ 1	◯ 2	◯ 3
Activate a National honey bee laboratory and research Centre	◯ 1	◯ 2	◯ 3
Provide experts able to support beekeepers on field (e.g. inspections, samples to verify health of bees, suggestions, etc.)	◯ 1	◯ 2	◯ 3
Activate the mobile laboratories to provide lab analysis	◯ 1	◯ 2	◯ 3
Provide adequate medicines and protocols for treatments against Nosemosis	◯ 1	◯ 2	◯ 3
Provide adequate medicines and protocols for treatments against varroa and virosis	◯ 1	◯ 2	◯ 3
Recommendations on quality of hive products			
Guarantee quality of honey (e.g. controls on residues, frouds, etc....) and other hive products	◯ 1	◯ 2	◯ 3
Recommendations on training			
Provide beekeepers with training on good beekeeping practices	◯ 1	◯ 2	◯ 3
Provide training to beekeepers from experts on bee diseases	◯ 1	◯ 2	◯ 3
Recommendations on bee management			
Promote modern beehives	◯ 1	◯ 2	◯ 3
Reduce use of antibiotics and other chemicals in beekeeping (sustainable beekeeping)	◯ 1	◯ 2	◯ 3
Reduce the import of honey bees from abroad	◯ 1	◯ 2	◯ 3
Other recommendations: please, specify (if you have any)			
.....	◯ 1	◯ 2	◯ 3
.....	◯ 1	◯ 2	◯ 3

3 - Current situation on HBH and HB disease control

Key challenges that MoEWA faces in relation to organizational frameworks (1/3)

3

1) No well-defined system for communication between central and regional administrations and the field services
2)Legal framework not appropriate and not fully compliant with international standards (e.g. notifiable list of WOAH for HB diseases)
3) Absence of a mandatory registration of beekeepers and identification of hives able to monitor movements/mortality of beehives and register treatments, and traceability system
4) A surveillance programme or reporting system for honey bee disease is not available

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3 - Current situation on HBH and HB disease control

Key challenges that MoEWA faces in relation to organizational frameworks (2/3)

3

5) No involvement of the private practitioners and veterinary pharmacies, as the use of veterinary medicines in beekeeping seems not controlled
6) There is no planning and implementation of veterinary services core activities in beekeeping
7) There is no designed National Bee Health Reference Laboratory and so far labs do not have a quality management system in line with ISO standards (impossible reporting international communication of results), as well as is lacking of trained people able to use the available devices

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Key challenges that MoEWA faces in relation to organizational frameworks (3/3)

3

8) A risk assessment strategy to prioritise the interventions is not available

9) Guidelines or operating procedures for officers concerning the biosecurity measures for honey bee diseases are missing

10) Contingengy plans for exotic (Tropilaelaps, SHB) or emerging (Nosema) HB diseases should be set-up

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Outline of presentation

4 **Benchmarking process and gap analysis**

Apiary of traditional hives
in Makkah Region

Good beekeeping practices

4

1) Use of modern beehives: 30% ca. in KSA

In Europe, USA and Canada traditional hives are no more in use (only in museum or cultural events). In Italy are forbidden (to avoid spread of HB diseases). Their inspection is not possible, as well as many other activities. Moreover, their honey production is lower.

Traditional hives apiary

2) Migratory beekeeping: 95% ca. in KSA.

In Northern America it is 12%; in EU is 9%. Migratory beekeeping represents itself a risk for spread of honey bee diseases. But is unavoidable in KSA. For this reason, beehives that are moved MUST be healty!

Migratory beekeeping in KSA

4 - Benchmarking process and gap analysis

4

3) Respect the carrying capacity of the areas where the apiary is located.
Carrying capacity should be respected to avoid starvation and higher risk to spread diseases. In the world, carrying capacity: 100 hives/2.5 Km^2
In KSA:
- 50 hives/2.5 Km^2 for hybrids A. mellifera
- 150 hives/2.5 Km2 for *A.m. jemenitica*.

4) Training of beekeepers. Beekeepers should be able to recognize the diseases and should be aware on how to treat them (especially with organic compounds). Treatments should be focused against a specific disease. Possibly with organic compounds.

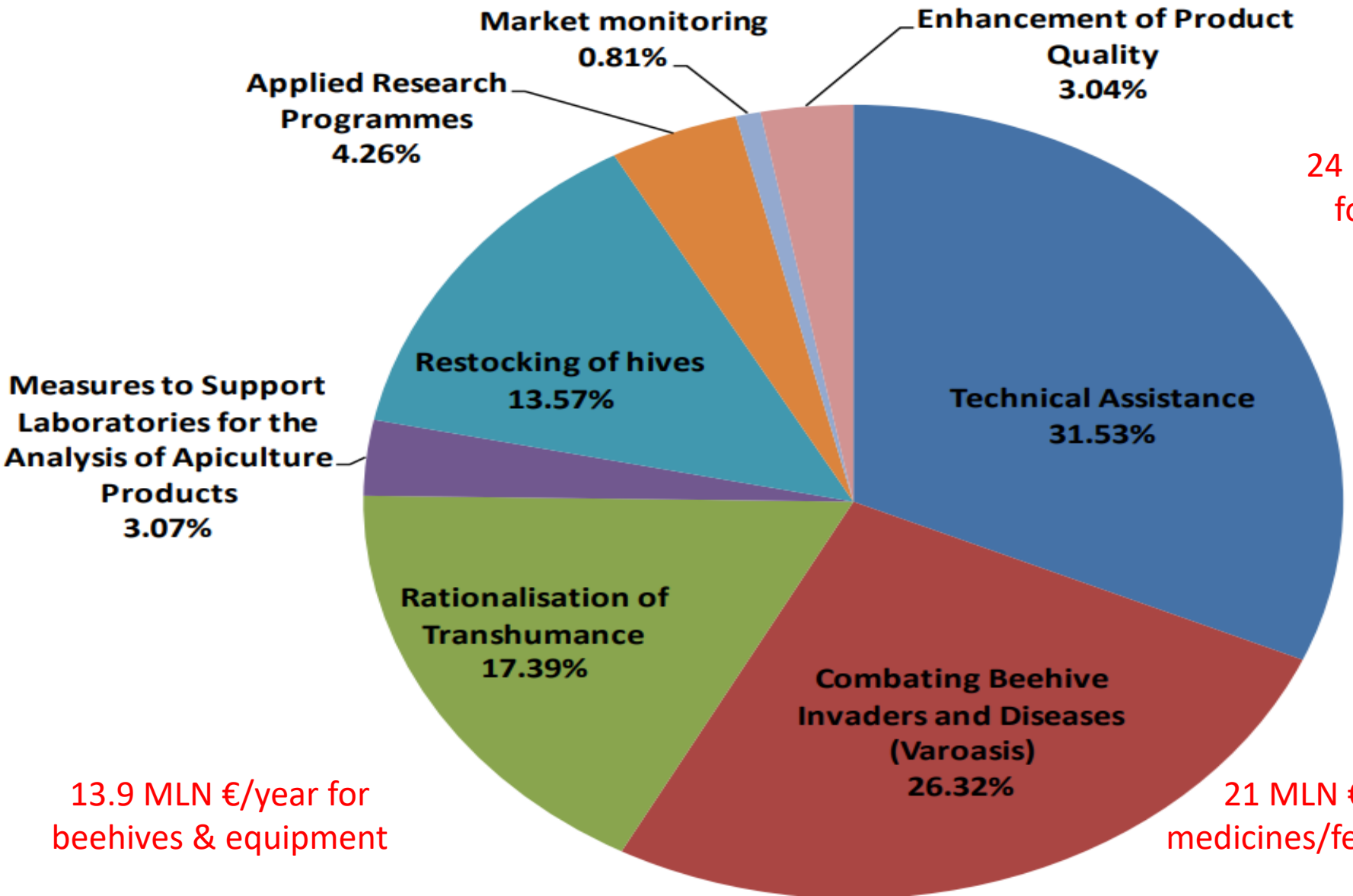
Do you use antibiotics for any of the following?			
	European Union (N=92)	United Kingdom (N= 85)	North America (N= 49)
Nosema	3%	1%	14%*
Varroa	4%	4%	4%
American Foulbrood	3%	0%	8%
European Foulbrood	0%	1%	8%*
Total	**10%**	**6%**	**34%***

*=p<0.05, ** = p<0.01

Source: https://www.izslt.it/wp-content/uploads/2021/09/AMR_beekeeping_survey_report_v2.pdf

EU Apiculture programme 2020: 80 MLN € investments on different measures

Benchmark!



24 MLN €/year for training

13.9 MLN €/year for beehives & equipment

21 MLN €/year for medicines/feeds/research

Benchmarking the therapeuthic choice (N. of veterinary medicines registered for the bees)

4

In KSA there is a Wide use of unregistered antimicrobials (antibiotics included).

No organic medicines in KSA are registered for the honey bees.

Beekeepers have too low therapeutic choice for their bees.
They have only 1 product (fluvalinate – which has been proved varroa-reistance) to control varroa, and 1 antibiotic treatment.

Fluvalinate registered strips, for varroa treatment

4 - Benchmarking process and gap analysis

Medicines registered in Italy for varroa

- ✓ Apilifevar
- ✓ Apiguard
- ✓ Thymovar
- ✓ Apistan
- ✓ Polyvar
- ✓ MAQS
- ✓ Varterminator
- ✓ Apifor60
- ✓ Varromed
- ✓ Api-Bioxal (polvere, liquido)
- ✓ Oxuvar
- ✓ Oxybee
- ✓ Apitraz
- ✓ Apivar

No antibiotic is registered for honey bees in Europe

Awareness on the impact on the hive products of medicines and medicated feeds administered to the bees and of AMR

4

Do you know what antibiotic residues are?			
	European Union (N=127)	United Kingdom (N=91)	North America (N=55)
Yes	90%	80%	84%
No	10%	20%	16%

Source: https://www.fao.org/antimicrobial-resistance/resources/resources-details/en/c/1441898/

How much do you believe drug resistant infections will impact you, your friends and family, and your bees?			
	European Union (N=108)	United Kingdom (N=84)	North America (N=51)
No Impact	4%	2%	0%
A little impact	12%	14%	27%
A large impact	84%	83%	73%

Winter mortality of HB in KSA

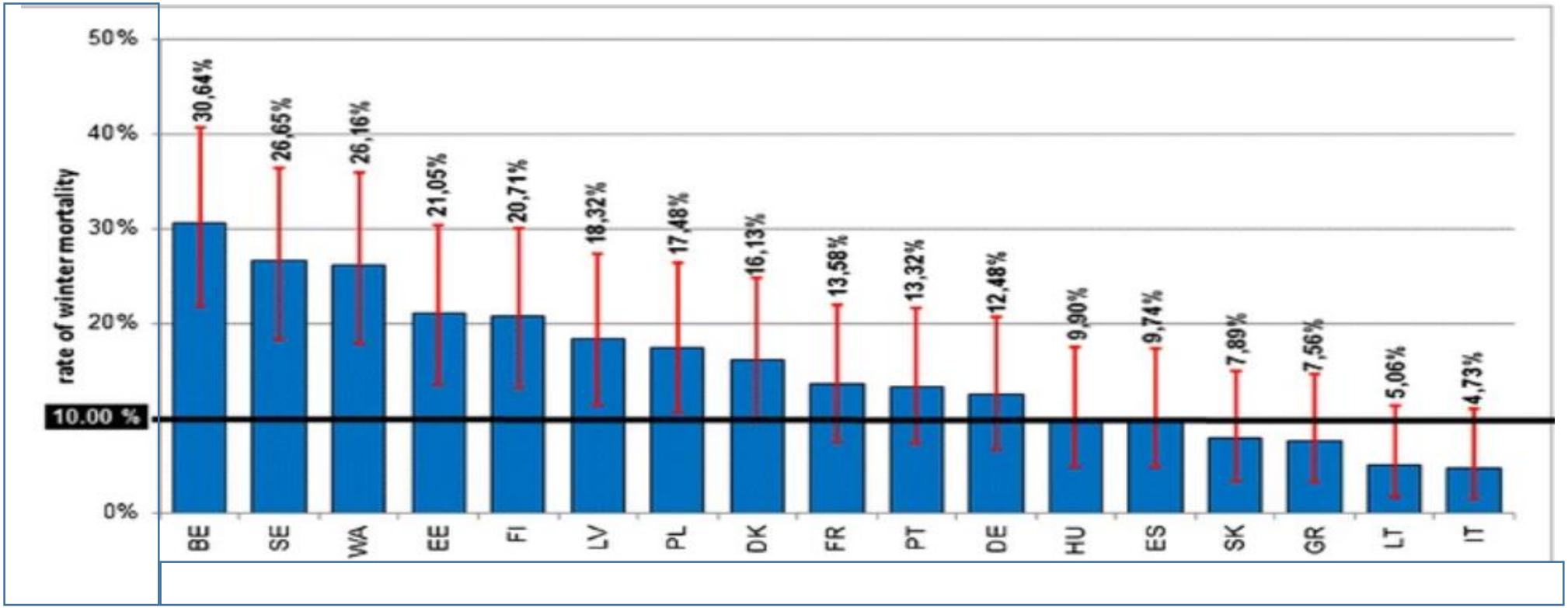
4

Winter mortality declared by beekeepers during the missions was 44%.

It's a too high mortality rate, benchmarking it with data from 17 EU member states (EPILOBEE, 2016).

In the US in 2021: with a winter mortality of 45%, they called for an emergency status of the sector (BIP).

To monitor HB yearly mortality, all EU and North American Countries activated a **beekeeping national register.** In KSA it is missing.



Winter mortality in 17 EU member states in 2016 (EPILOBEE project).

Honey bee diseases

4

Varroa: we found in 29.2% (7 out of the 24 inspected apiaries) an average threshold >2% varroa mites/adult bees.
In EU healthy bees in spring should not have more that 1% of varroa mites/adult bees.

Other diseases: Nosemosis by *N. apis* or *N. ceranae*, tracheal mite (*Acarapis woodi*) and virosis it is needed to wait results of laboratory analisis and sequencing.
No surveillance plans are available.
Surveillance programmes should be set-up for the OIE listed diseases, but, at least for varroa, nosemosis and American Foulbrood (AFB).

On field assessment of varroa infestaion levels

Honey bee diseases

4

Concerning the HB diseases listed by WOAH, EU and North American countries activated a **Surveillance programme**. The same should do KSA, integrating it with a risk analysis approach.

In addition, KSA should activate a Surveillance system for Nosemosis, to safeguard HBH and HH (residues and AMR).

Do you know what drug-resistant infections are?			
	European Union (N=127)	United Kingdom (N=92)*	North America (N=55)
Yes	92%	98%	90%
No	8%	2%	10%
*=p<0.05, ** = p<0.01			

Results in EU and North America on AMR.

Source: https://www.fao.org/antimicrobial-resistance/resources/resources-details/en/c/1441898/

Imported bees: veterinary quarantine and border control – HBH aspects (1/3)

4

These bees are earmarked to people that have no idea of HBH and biosecurity measures. For this reason they must be healthy.
Behave is addressed by international legislation (WOAH and WTO): each Country has the right to determine the level of HBH to require, **based on an assessment of the risks** involved. However governments may be required to justify their higher standard based on scientific evidence and the risks involved (WTO SPS Agreement).

The Border Inspection Point of the Riyadh airport

Imported bees: veterinary quarantine and border control – HBH aspects (2/3)

4

Controls must be done with a risk analysis strategy!

Varroosis: monitor randomly Varroa infestation levels. They should be inferior or equal to 1,5%.

Nosemosis: nosema infection seems to be the higher issues of the imported bees, even because of the stress linked with transportation. Samples should be random and risk based strategy. Levels should always be $<1x10^4$ spores/bee.

Evaluation of the varroa infestation levels.

Imported bees: veterinary quarantine and border control – HBH aspects (3/3)

4

For the exotic diseases like the Asian mite (*Tropilaelaps clareae*) and Small hive beetle (*Aethina tumida*) contingency plans should be set-up.

In case of the identification of the above-mentioned diseases, the stamping-out is required.

Samplings in the Border Inspection Point of the Riyadh airport

4

Imported bees: other aspects related to HBH

HB welfare aspects: too high mortality of the bees during transportation;

death of all the imported bees at the end on the beekeeping season.

Genetic aspects: hybridization with local bees.

Genetic pollution may results from imports of hybrids subspecies from Egypt

Outline of presentation

5 **National HBH strategic framework**

Apiary of traditional hives
in Makkah Region

5 – National HBH strategic framework

VISION: sustainable honey bee health in KSA.

MISSION: strengthen national capacity for bee diseases surveillance and risk-based prevention, control, emergency preparedness and contingency plan.

Strategic Objective 1: effective honey bee disease surveillance.

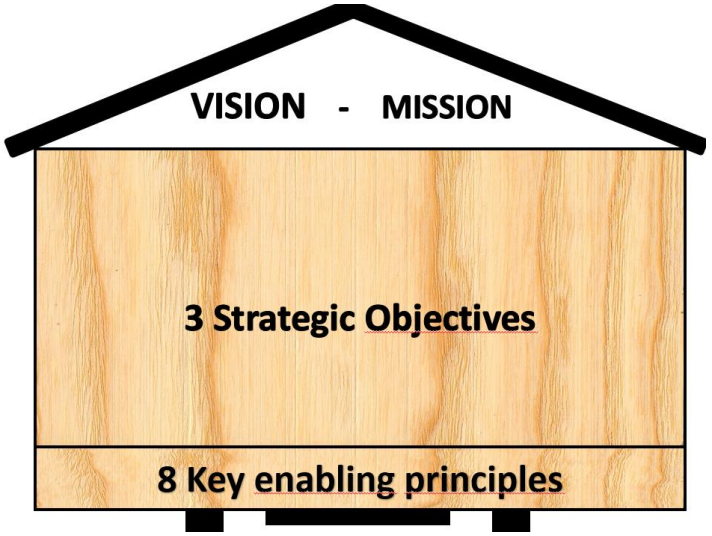
Strategic Objective 2: risk-based honey bee disease prevention and control.

Strategic Objective 3: improved governance and services for sustainable honey bee health.

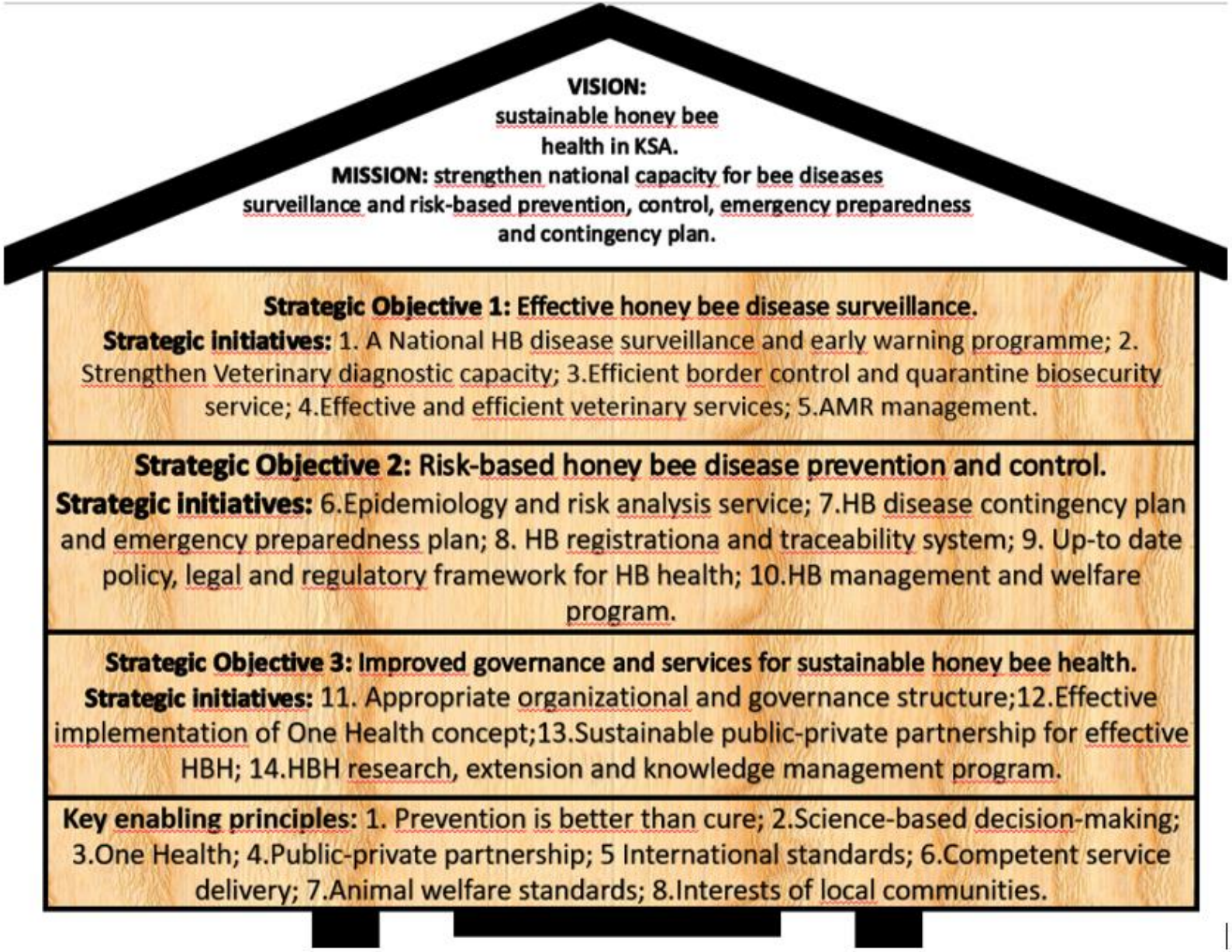
14 strategic initiatives

8 enabling principles

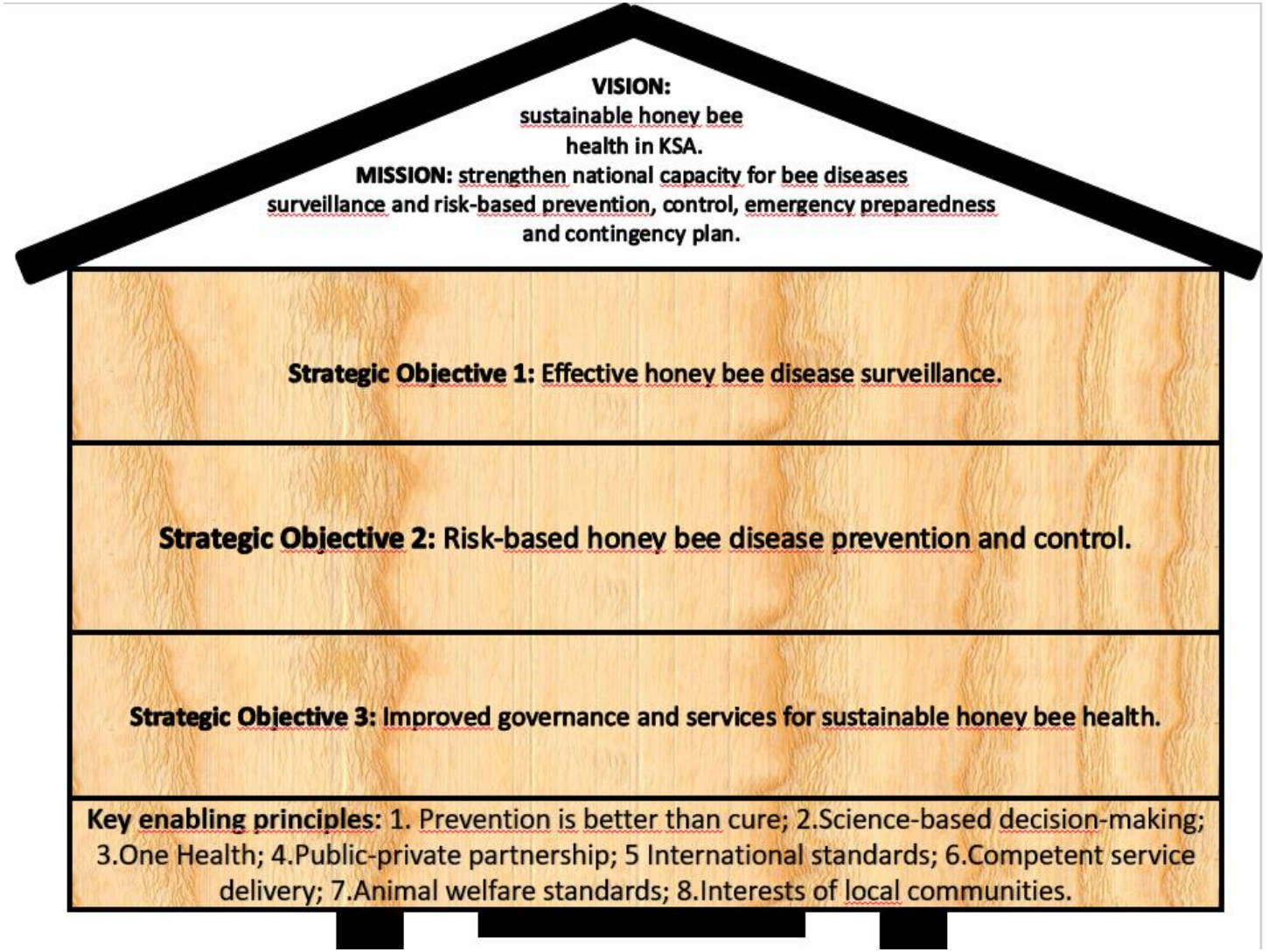
Compliance with international standards (WTO – WOAH – WHO – IHR)



5 – National HBH strategic framework



5 – National HBH strategic framework



Outline of presentation

6 **Mitigation measures**

Apiary of traditional hives
in Makkah Region

6 – Mitigation measures

1. At the apiary level, to improve HBH:

Improve transition toward modern beehives through the adoption of modern, well insulated beehives (movable frames)

Training of beekeepers on good beekeeping practices and biosecurity measures in beekeeping

6

Provide beekeepers with **veterinary medicines** (above all organic!) **and feeds** for varroa and nosema control

Modern beekeeping in KSA

Beekeepers event in in Saudi Arabia's Qassim

2. MoEWA could provide:

Extension services:
(public-private partnership) with a well-structured veterinary extension programme and advisory services, under the coordination of a competent MoEWA expert (eg. through extensions: may provide beehives, organic feeds, prescriptions for medicines, etc.). Involvement of the mobile clinics!

6

Registration of Veterinary medicines and medicated feeds: authorization of medicines (above all organic). Foreseen the prescription is relevant for traceability and involvemen of private veterinarians in the sector. Sustainable means no antibiotics.

Beekeeping extension service

6 – Mitigation measures

Set-up a surveillance programme for HB diseases: monitoring prevalence and incidence of notifiable and emerging HB diseases, preventing (good beekeeping practices) and set-up early detection and controls (biosecurity measures); set-up contingency plans (for exotic or emerging-nosemosis diseases).
A reporting system should be foreseen.

Set-up a surveillance programme for HB diseases

Activate a national registry for beekeepers and traceability systems

6

eg. to track hives and the whole honey value-chain.

6 – Mitigation measures

Key enabling principle:
Science-based decision-making

Promotion of knowledge:

- training of bee health officers;
- training of beekeepers;
- training of extensionists.

Training in beekeeping

6

6 – Mitigation measures

MoEWA training for beekeepers providing guidelines and protocols.

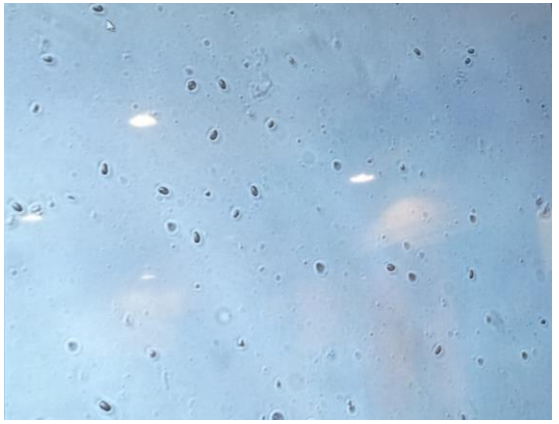
MoeWA training for Veterinarians dedicated to the coordination of the beekeeping sector

Identify **Veterinarians in charge of the beekeeping sector**
(both at the National and at the Regional/Branches level),
provided with a specific training.

6

Activities: definition and evaluation of the HB disease surveillance plans, prevention and control.

Sampling of adult bees in Al Baha



Nosema spores in intestinal content of adult honey bees

Certified competences of the Veterinarians in charge of the beekeeping sector

6

- Risk analysis, Epidemiology, Management of disease control programs, ISO 9001/2015 (Quality Management System)
- honey bee diseases (a.a. symptoms);
- biosecurity measures in beekeeping (above all, farmaceutical control of HB disease, residues in hive products);
- Official samplings at the apiary level (to verify HBH and residues);
- International standard roles: WOAH (Terrestrial HBH Code; The Manual of Diagnostic Tests and Vaccines), WAHIS portal, WTO SPS and TBT agreements, Codex Alimentarius.

Evaluation of the brood

MoEWA training for Veterinarians dedicated to the coordination of the HBH laboratories and genetic selection of *A. mellifera* supbs.

Identify **Veterinarians specifically trained in charge for the coordination of the veterinary laboratories dedicated to HBH** (diseases and intoxication), including the **mobile clinics and genetic selection of A. mellifera subsp**.

6

Activities: coordinate and supervise the laboratory activities of the HBH laboratories and genetic centres.

Stereomicroscopes in Al Baja for artificial insemination of the HB queens

Mobile laboratory during mission in Jazan Region

Certified competences of the Veterinarians in charge of the coordination of the HBH laboratories and genetic selection of *A. mellifera* supbs.

Requirements: certified competences on

- Risk analysis, Statistic, Epidemiology, ISO/IEC 17025 (accreditation of laboratory of analysis)
- honey bee diseases (a.a. diagnosis, PCR, HPLC);
- biosecurity measures in beekeeping (above all, farmaceutical control of HB disease, residues in hive products);
- Official samplings at the apiary level (to verify HBH and residues);
- International standard roles: WOAH (The Manual of Diagnostic Tests and Vaccines; Terrestrial HBH Code), WAHIS portal, WTO SPS and TBT agreements, Codex Alimentarius.

6

Laboratory in Al Baha

Content for training of beekeepers

1) Awareness on proper bee management and Good Beekeeping Practices;
2) Awareness on biosecurity measures in beekeeping;
3) Awareness of responsible use of medicines at the apiary level;
4) Regulatory framework
    - diseases: national strategy (surveillance systems; Prevention; Control)
    - registration of beekeepers
    - traceability systems (bee movements, medicines, honey lots, etc.)
    - medicines registered for honey bees
    - feed registered for honey bees

6

Imported bees

Strengthen the capacity for border control and quarantine (key enabling principle “Prevention is better than cure”.

Criteria:

- compliance with international standards (OIE Manual);
- export certifications (treatments and selection for nosema resistance);
- sanctions in case of not in conformity.

Container for package bees. It contains one strip to hold the queen cage and another with the acaricide treatment

6

6 – Mitigation measures

Needs:

- refrigerated areas (10°C ca.);
- trained personnel;
- risk-based controls;
- monitor varroa (threshold: < 1,5%)
- monitor nosema (threshold: <9x10^3 spores/bee).

Refrigerated container

Mitigation measures to prevent spread of HB diseases:

6

- Health certificate
- health status control at entrance in KSA (varroa and nosema)
- identify restricted areas
- activate traceability of bees and beekeepers

6 – Mitigation measures

Diseases prevention and contingency planning for Tropilaelaps:

- import only packages without combs.
- deepen controls on imports of bees from Asia.
- Incineration in case of presence of the parasite.

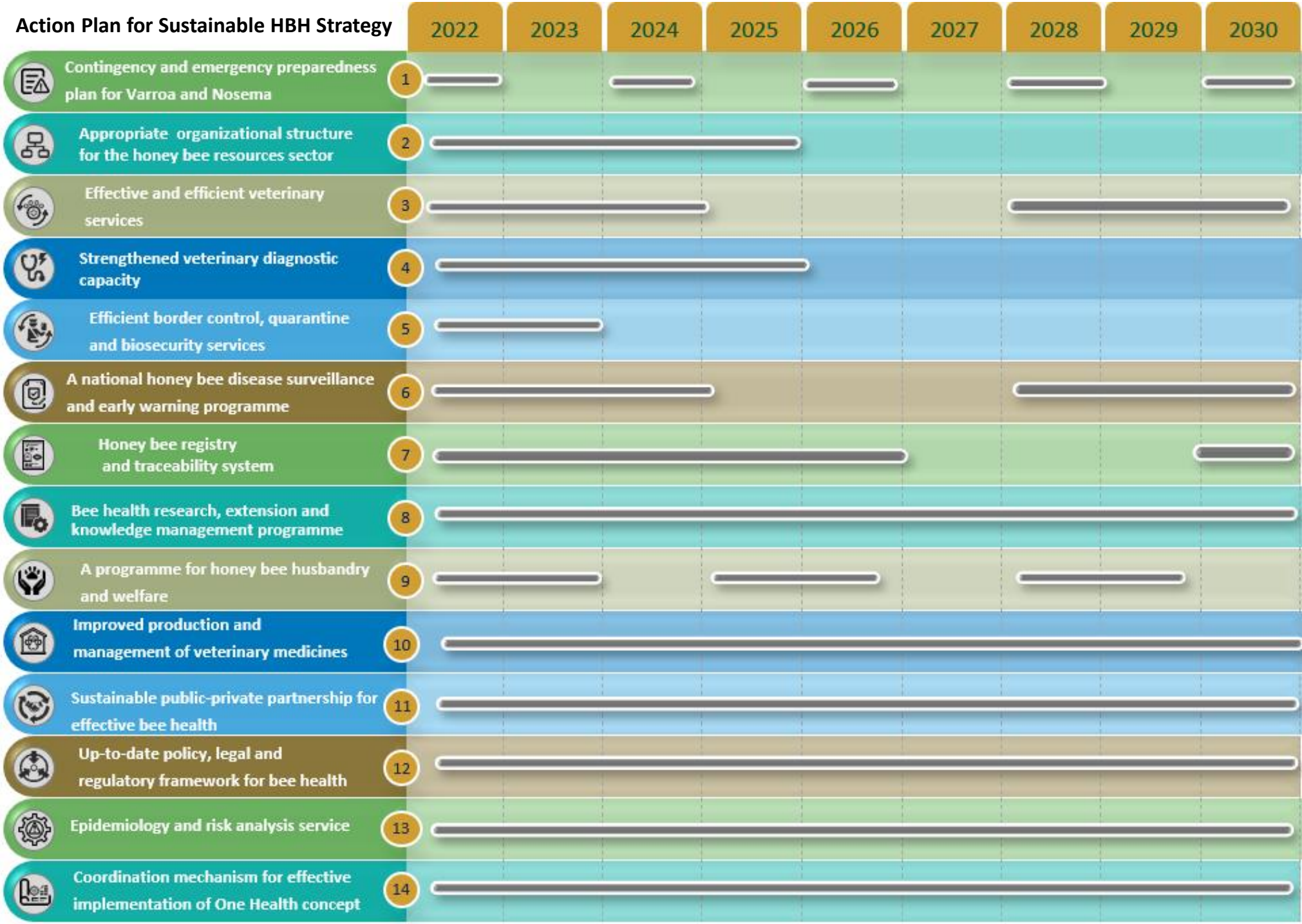
Varroa (left) and Tropilaelaps (right)

6

Outline of presentation

7 **Action plan**

Apiary of traditional hives
in Makkah Region


Action Plan for Sustainable HBH Strategy
2022
2023
2024
2025
2026
2027
2028
2029
2030
Contingency and emergency preparedness plan for Varroa and Nosema
1
Appropriate organizational structure for the honey bee resources sector
2
Effective and efficient veterinary services
3
Strengthened veterinary diagnostic capacity
4
Efficient border control, quarantine and biosecurity services
5
A national honey bee disease surveillance and early warning programme
6
Honey bee registry and traceability system
7
Bee health research, extension and knowledge management programme
8
A programme for honey bee husbandry and welfare
9
Improved production and management of veterinary medicines
10
Sustainable public-private partnership for effective bee health
11
Up-to-date policy, legal and regulatory framework for bee health
12
Epidemiology and risk analysis service
13
Coordination mechanism for effective implementation of One Health concept
14

Strategic Objective 1: effective HB disease surveillance

Initiative 1: A national HBH surveillance and early warning programme

Outputs:

1.1 A passive and active surveillance and early warning system, case definitions and guidelines for for detection and reporting of nosema and varroa established

1.2 A passive and active surveillance and early warning system, case definitions and guidelines for for detection and reporting of other notifiable diseases established (*A. woodi*, AFB)

1.3 A network of the trained stakeholders for the surveillance and HB disease ,early warning established (including monitoring of varroa infestation), and control provide treatments/feeds to beekeepers.

1.4 Epidemiological situation assessment and investigations- of notifiable HB diseases elaborated and provided

Strategic Objective 1: effective HB disease surveillance
Initiative 2: strengthened veterinary diagnostic capacity

Outputs:

2.1 A National Veterinary Laboratory Network system established for diagnosis of HB diseases (even borders) and detection of antibiotics' and acaricides' residues in honey and comb honey (in collaboration MoeWA-SFDA)

2.2 Public labs ISO 17025 Quality System accredited. Collaboration with external labs.

2.3 Standard operating procedures established

2.4 Laboratory staff skills improved

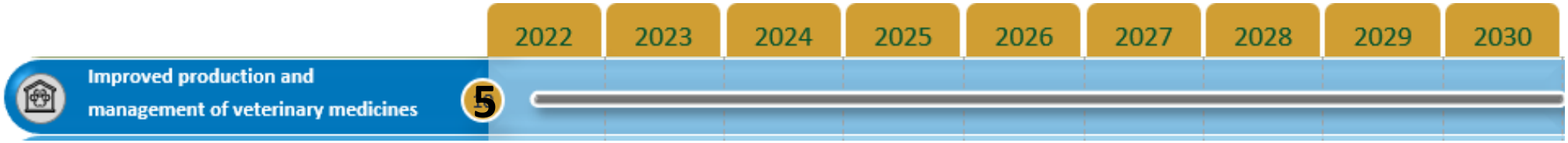
Strategic Objective 1: effective HB disease surveillance
Strategic initiative 3: Efficient border control and quarantine biosecurity services

Outputs:

3.1 Border Control and Quarantine biosecurity services's ISO Quality Management System (QMS) Introduced and implemented

3.2 An electronic notification system for import of hives developed, tested and implemented

3.3 Border and quarantine points inspectors appointed and trained



Strategic Objective 1: effective HB disease surveillance
Strategic initiative 5: management of AMR (previously named: «Improved production and management of veterinary medicines»)

Outputs:

5.1 Temporary authorization of veterinary medicines

5.2 Policies, regulation and guidelines on the use of antimicrobials in beekeeping

5.3 Awareness and understanding of AMR among beekeepers and the public improved through effettive communication, education and training

5.4 National register of antibiotic use established and surveillance system for AMR implemented

5.5. Action plan to optimize the use of antimicrobials.

5.6 Effective alternative measures to reduce the need for antibiotics

7 - Action plan – Strategic Objective 2 – Strategic initiative 7 - Outputs

Strategic Objective 2: risk-based HB disease prevention and control

Strategic initiative 7: contingency and emergency preparedness plan

Outputs:

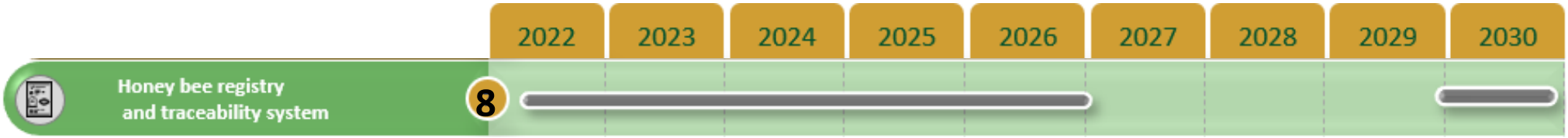
7.1 Emergency plan for *Tropilaelaps*

7.2 Emergency plan for *Aethina tumida* (SHB)

Set-up and spread protocols for Tropilaelaps and SHB

7.3 Compensation fund defined and agreed

7.4 Emergency communication plans developed and implemented



Strategic Objective 2: risk-based HB disease prevention and control

Strategic Initiative 8: HB registration and traceability system

Outputs:

8.1 Regulatory provision, methodology, standards and tool and movement control forms prepared

8.2 Web-based database for the system developed and implemented

8.3 Activate stakeholders' network established (e.g. SFDA, national and regional branches)

8.4 Beehives identification and registration and traceability procedures implemented

Strategic Objective 3: improved governance and services for sustainable honey bee health

Strategic initiative 14: BH research, extension and knowledge management programme

Outputs:

14.1 Establish a National HB research Center and provide it with equipment and staff

14.2 Needs based HBH research program developed and implemented

14.3 demand driven HBH extension program formulated and implemented for small beekeepers, private veterinarians and other stakeholders

14.4 A platform established for HBH knowledge management and dissemination among beekeepers

14.5 National communication campaigns

Thank You