

MOLECULAR GENETIC CHARACTERIZATION OF DAHLEM RED LAYERS

Ch. Shivaprasad
Assistant Professor (AGB)
ILFC; C.V.Sc. Korutla, SVVU,
Telangana, India

INTRODUCTION

- It is a layer type
- Big size brown colored egg
- Disease resistant
- Back yard poultry production



DAHLEM RED BIRDS

OBJECTIVES

- Molecular genetic characterization Dahlem Red layers using RAPD markers
- To study the genetic similarity and genetic distance between full sib, half sib mated non-inbred groups

MATERIALS AND METHODS

- ❖ A total of 48 birds
- ❖ A total of 100 decamer primers serially numbered PDP40F to PDP115F and PDP155F to PDP 180F
- ❖ Genomic DNA isolated from blood samples
- ❖ Checking quality of DNA
- ❖ Checking quantity of genomic DNA

RAPD-PCR ANALYSIS

➔ Amplification were carried out final volume of 12.5 μ l

25 pM primer

200 μ M of the dNTPs

2 mM Magnesium chloride

1.25 U Taq DNA polymerase

1.25 μ l 10X PCR buffer

100 ng genomic DNA

PCR REACTION

Step	Temperature	Duration	
Initial denaturation	95° C	2 minutes	
Cyclic denaturation	94° C	1 minutes	} 40 Cycles
Primer annealing	36° C	1 minutes	
Primer extension	72° C	2 minutes	
Final extension	72° C	10 minutes	
Held at	4° C	Forever	



```
graph TD; A[ ] --> B[Electrophoresis]; B --> C[Visualized by UV transilluminator]; C --> D[Gel documentation]; D --> E[Analysis of Results by using data base software];
```

↓

Electrophoresis

↓

Visualized by UV
transilluminator

↓

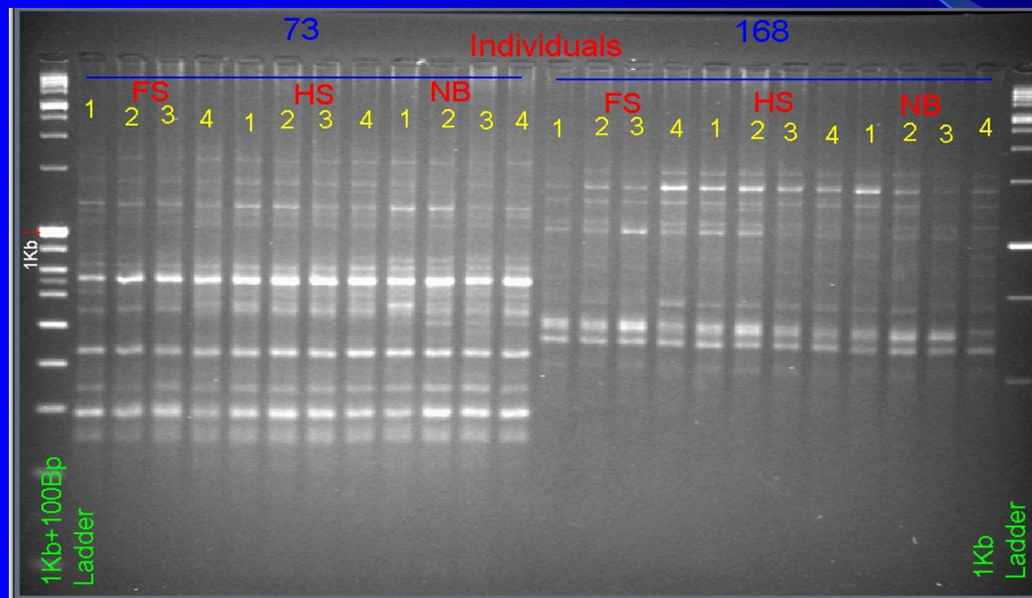
Gel documentation

↓

Analysis of Results by
using data base software

STATISTICAL ANALYSIS

- The scoring and matching of bands-binary character matrix



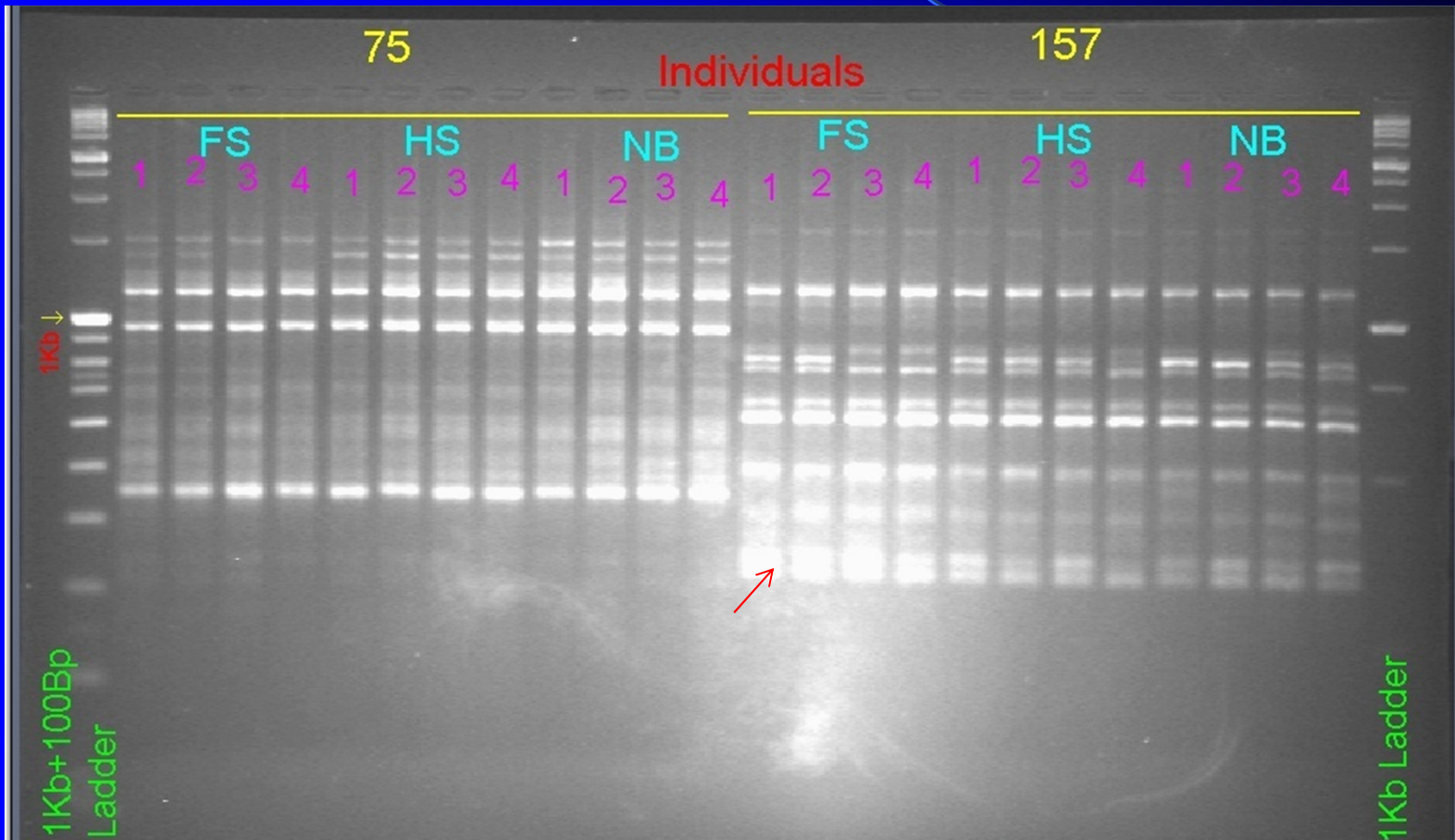
- Band sharing- Nei's method
- Band frequency- Raman *et al.*
- Genetics distance- Kuhnlein *et al.*

RESULTS

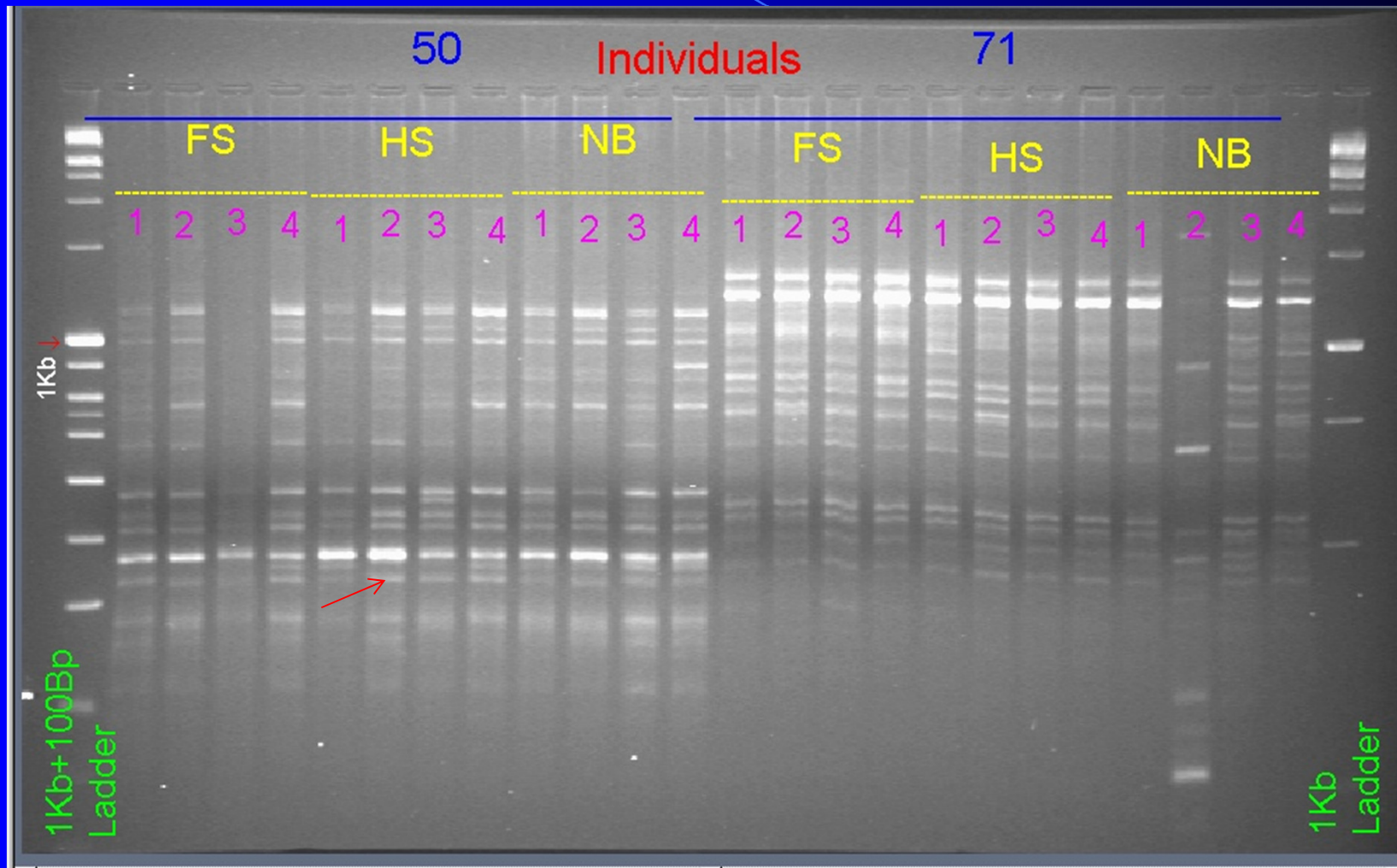
Primer name	Number of bands amplified		Size range (bp)	
	Total	Polymorphic	Minimum	Maximum
PDP40F	14	10	391	1592
PDP42F	12	4	321	1660
PDP50F	17	12	215	1788
PDP54F	19	9	297	3223
PDP62F	14	7	319	1530
PDP63F	19	11	259	3408
PDP71F	23	18	140	3158
PDP72F	18	13	265	2872
PDP73F	17	9	252	2480
PDP75F	14	8	344	1711
PDP77F	15	5	263	3409
PDP78F	17	10	100	1542
PDP79F	19	10	182	2054
PDP94F	17	12	282	1752
PDP96F	14	9	111	2176
PDP103F	20	18	223	2797
PDP110F	12	5	143	1966
PDP112F	15	7	219	1697
PDP157F	16	10	213	1866
PDPF168F	12	7	450	2921
PDP176F	17	10	262	1538
Total	341	204	-	-

RAPD-PCR FINGERPRINTS

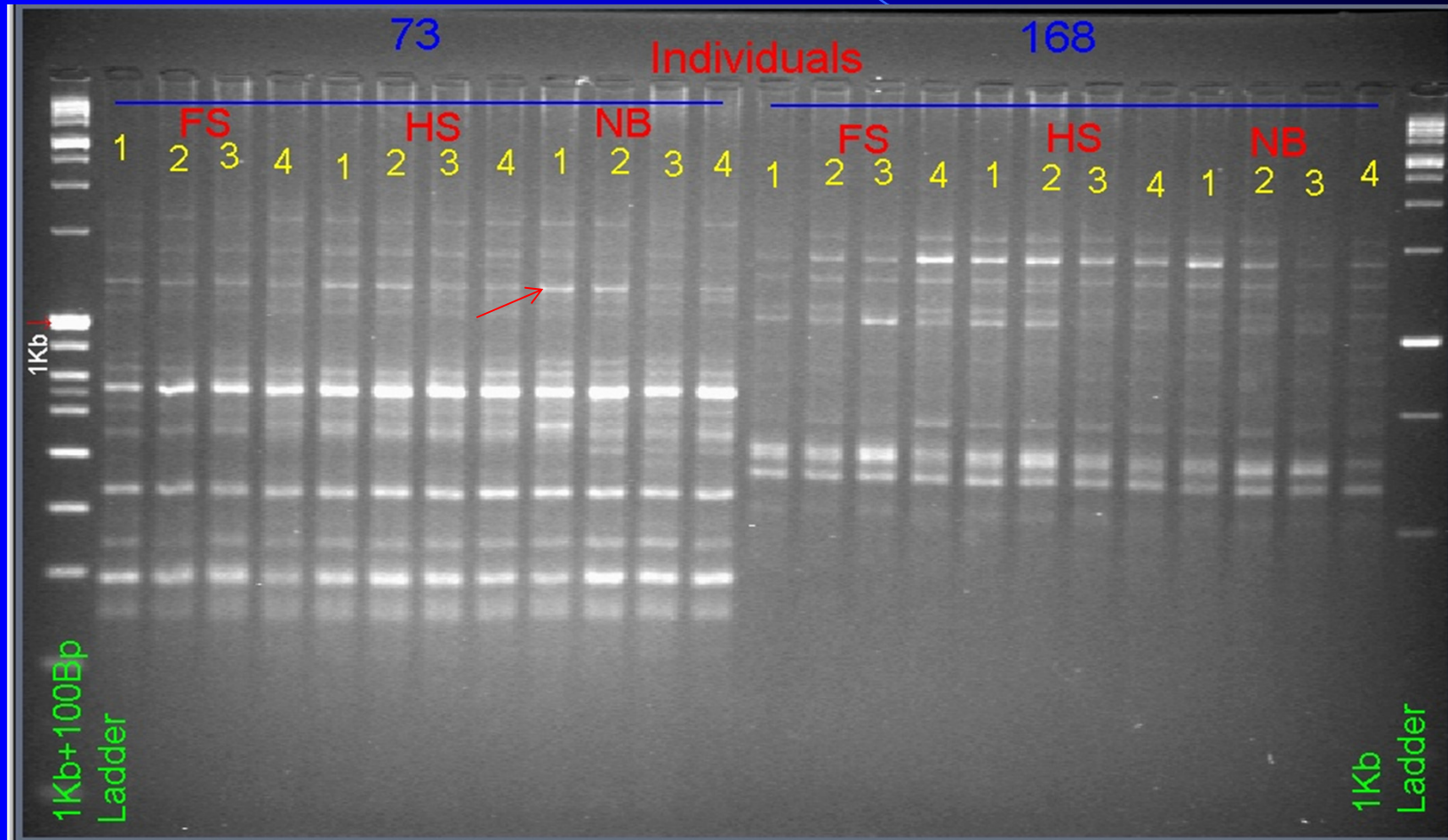
Full sib-unique presence of 1866bp



Half sib-unique presence of 1788bp



Non-inbred-unique presence of 421 pb



Intra-population genetic similarity based on band sharing

Primer name	Full sib	Half sib	Non-inbred
PDP40F	85.50	85.83	86.16
PDP42F	92.50	94.00	90.66
PDP50F	86.50	88.16	88.02
PDP54F	88.00	89.00	89.66
PDP62F	88.33	88.50	88.00
PDP63F	85.33	90.16	94.50
PDP71F	85.33	86.66	67.83
PDP72F	88.83	82.50	80.83
PDP73F	87.66	91.00	85.50
PDP75F	85.66	95.00	96.00
PDP77F	93.66	89.33	92.66
PDP78F	89.00	83.16	80.16
PDP79F	85.66	88.83	80.66
PDP94F	94.33	93.00	75.16
PDP96F	82.83	82.00	78.83
PDP103F	74.16	71.16	75.83
PDP110F	93.33	87.50	88.16
PDP112F	79.66	85.50	77.33
PDP157F	91.33	91.66	88.33
PDP168F	97.00	90.66	77.50
PDP176F	91.33	91.33	81.00
Mean	87.90	87.85	83.94
SE	1.14	1.14	1.58

Inter-population genetic similarities based on band sharing using pooled DNA

Primer name	Full sib and Half sib groups	Half sib and Non-inbred groups	Full sib and Non-inbred groups
PDP 40F	70.00	80.00	76.19
PDP 42F	91.66	84.61	84.61
PDP 50F	85.71	81.81	86.95
PDP 54F	88.23	80.00	92.5
PDP 62F	96.29	88.88	76.92
PDP 63F	94.11	88.88	89.47
PDP 71F	73.68	90.00	73.68
PDP 72F	89.65	92.85	96.77
PDP 73F	93.33	94.11	87.50
PDP 75F	91.89	97.43	89.47
PDP 77F	87.50	84.21	93.33
PDP 78F	100.00	88.88	88.88
PDP 79F	95.65	72.72	86.95
PDP 94F	84.61	81.48	88.88
PDP 96F	93.75	91.42	84.84
PDP 103F	84.61	92.85	91.66
PDP 110F	90.90	95.65	95.65
PDP 112F	94.73	90.00	94.73
PDP 157F	100.00	90.90	90.90
PDP 168F	95.23	95.65	90.90
PDP 176F	92.30	96.55	88.88
Mean	90.18	88.51	88.07
SE	1.64	1.43	1.34

Intra-population genetic similarities based on band frequencies

Primer name	Full sib	Half sib	Non-inbred
PDP 40F	75.00	77.08	81.81
PDP 42F	89.58	93.75	97.72
PDP 50F	85.00	85.93	87.50
PDP 54F	83.82	89.70	85.52
PDP 62F	80.35	85.71	83.33
PDP 63F	80.35	91.66	98.33
PDP 71F	95.00	90.62	67.04
PDP 72F	85.29	82.69	71.15
PDP 73F	82.14	85.71	85.29
PDP 75F	88.46	91.66	100.00
PDP 77F	92.85	82.14	90.00
PDP 78F	78.84	75.00	75.00
PDP 79F	82.35	80.88	76.38
PDP 94F	90.90	90.38	68.75
PDP 96F	84.09	81.25	71.15
PDP 103F	72.50	70.83	62.50
PDP 110F	90.90	84.09	95.45
PDP 112F	79.54	80.46	71.66
PDP 157F	85.00	88.46	87.50
PDP 168F	100.00	92.50	72.91
PDP 176F	88.33	86.53	75.00
Mean	85.25	85.09	81.14
SE	1.45	1.33	2.43

Inter-population genetic similarities between groups based on band frequency

Primer name	Full sib and Half sib groups	Half sib and Non-inbred groups	Full sib Non-inbred groups
PDP 40F	60.20	64.56	59.45
PDP 42F	99.33	96.33	97.00
PDP 50F	82.50	73.90	89.25
PDP 54F	87.00	79.10	83.39
PDP 62F	88.78	87.73	83.16
PDP 63F	81.64	71.77	65.68
PDP 71F	72.61	66.72	67.31
PDP 72F	68.64	65.62	57.88
PDP 73F	79.46	73.24	78.42
PDP 75F	83.07	78.00	91.42
PDP 77F	82.66	85.80	89.26
PDP 78F	76.43	90.60	72.70
PDP 79F	90.30	70.89	75.54
PDP 94F	79.92	62.29	57.05
PDP 96F	75.56	88.18	69.02
PDP 103F	51.12	31.33	19.60
PDP 110F	80.38	82.35	87.35
PDP 112F	80.33	70.55	69.06
PDP 157F	76.66	76.28	68.68
PDP 168F	90.54	77.33	77.91
PDP 176F	83.28	68.88	69.35
Mean	79.53	74.34	72.78
SE	2.29	2.95	3.65

GENETIC DISTANCE

Groups	Full sib	Half sib	Non-inbred
Full sib	0.8789	0.2290	0.3176
Half sib		0.8785	0.2963
Non-inbred			0.8394

THANK YOU